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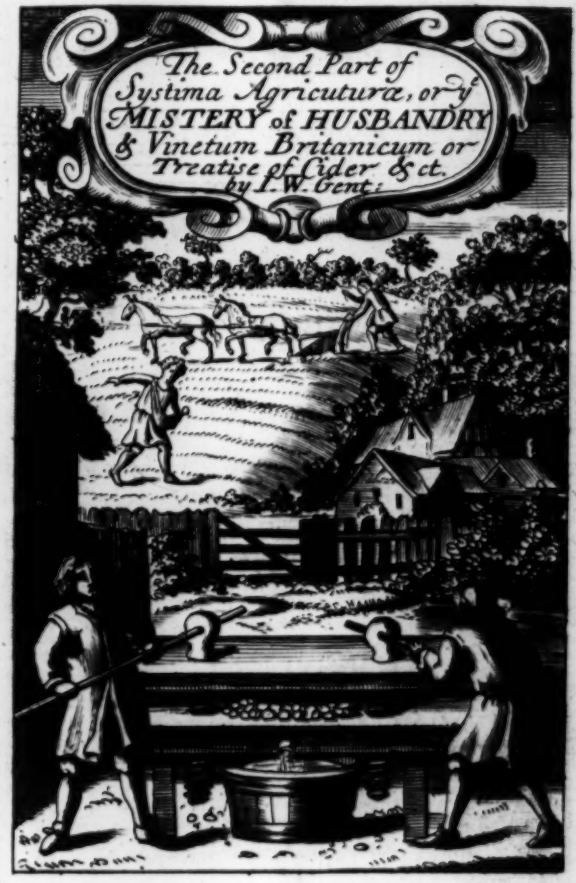
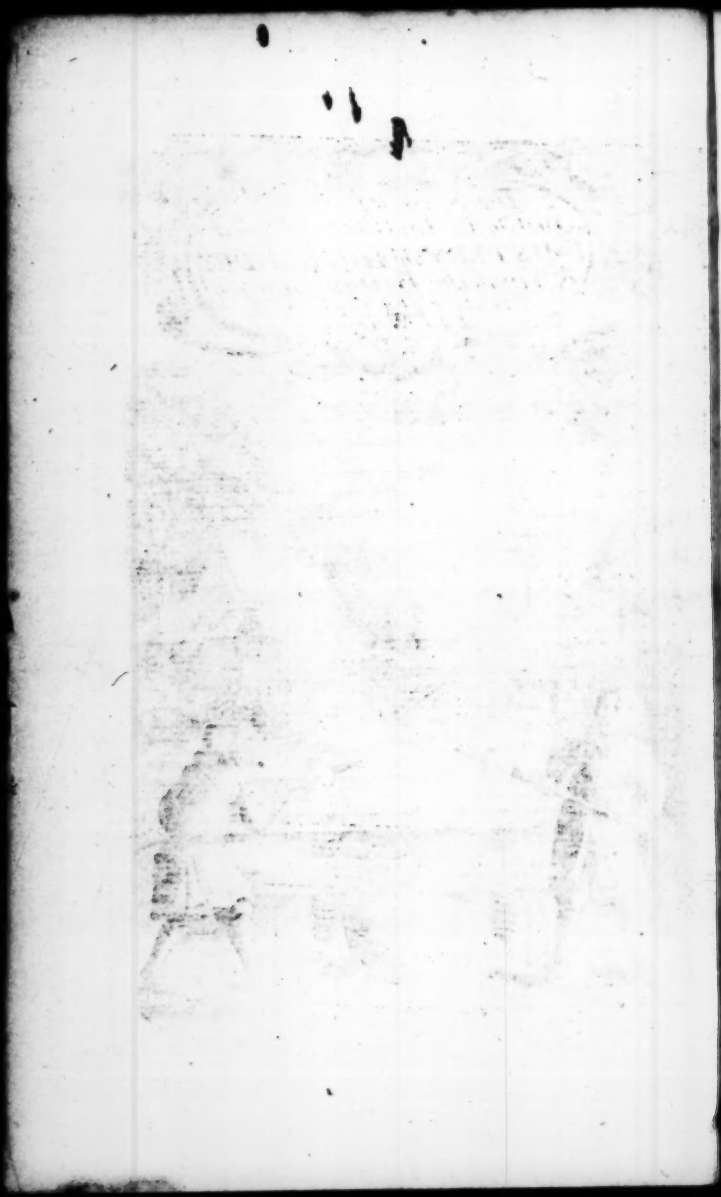

The Second Part of
Systima Agricultura, or ye
MISTERY of HUSBANDRY
& Vinetum Britanicum or
Treatise of Cider &c.
by I. W. Gent:



THE SECOND PARTS OF *Systema Agriculturæ*, OR THE Mystery of HUSBANDRY. AND *Vinetum Britannicum*, OR, A TREATISE of CIDER.

Wherein are contained many Select and Curious Observations and Novel Experiments relating to Husbandry and Fruit-trees.

With the best and most Natural Rules and Methods for the Making of *Cider*, and other *English*-Liquors.

To which is added,

An Essay towards the discovery of the Original of *Fountains* and *Springs*.

By *J. W.* Gent.

London, Printed for *George Grafton* at the *Mitre* in *Fleetstreet*, near *Temple-Bar*, 1689.

PROOEMIUM
IN
Laudem Agriculturæ.

Being the

PREFACE
OR
INTRODUCTION
TO THIS
Second Part.

Shewing the great Advantages that Husbandry *bringeth to Trade, and the dependencies the later hath on the former.*

IN the *Preface* to my former Treatiſe of *Husbandry*, I did

ſomewhat elucidate the excellency and utility thereof, it being an Art that hath the leaſt dependency on other Arts of any whatſoever, being content with only a few Tools for the breaking the ſtubborn Clods of the Earth, and the more eaſie ſeparating the Seed from the Husk; when there is no other *Science*, *Art*, or *Trade*, but hath mediately or immediately an abſolute reliance or dependency on *Husbandry*, or ſome of its Branches; As *Cicero* once ſaid, *Præclare & ille dixit, qui perhibuit Agriculturam aliarum Artium Matrem eſſe ac Nutricem.* More eſpecially the Maritime Trade of the whole World hath for the moſt part regard to the Products of the Earth obtained by Humane Labour and Induſtry: As the

the *Silks* and *Spices* of *Aſia*, the *Sugar*, *Tobacco*, *Indico*, &c. of *America*, firſt advanced Trading thither, and are yet the principal Commodities which allure our *Europeans* to make ſo long and dangerous Voyages into thoſe remote Parts. As for *Metals* and *Minerals*, another part of the ſubject of Trade, although I have not treated hitherto of them, yet may their extraction out of the obdurate parts of the Earth be deem'd a Branch of *Agriculture*.

It is particularly obſerv'd, that the planting of ſome certain Species of Vegetables, in places wherein they delighted, hath acquired unto, and maintain'd a Trade there: As the planting of *Tobacco* in *Virginia*, *Sugar* in *Barbadoes*, *Currans* in the Iſle of *Zant*, *Vines*

in the *Canaries* and in *France*. The like Instances may be produced of many other places, that by this Art of *Agriculture* only, have been infinitely enrich'd, and their Trade advanced.

It will be objected (I know) that there are many places very much enriched and improved by Trade, that have very little of *Agriculture* used therein; nor have the Inhabitants thereof but little Land to till or improve, having not Corn enough of their own growing to feed them: As *Venice*, and some of the *Provinces* of the *Low-Countries*, &c. and yet no places flourish more than these by Trade only. To which it may be answered, That although they have but little Land of their own, yet are they and their Trades maintained

tained by the Husbandry of their Neighbours: As *Middleburgh* in *Zealand*, *Amſterdam* in *Holland*, *Hamborough*, &c. depend on, and are maintained by the Husbandry of their Neighbouring *Germans*, *Danes*, &c. from whom they have their Corn, Cattel, *&c.* And to whom in lieu thereof they carry their own Manufactures, and the Products of foreign Countries. And one of the particular Reaſons why they grow ſo rich and great on ſo ſmall Territories, is the ſituation of their Countries, lying as places of Reſt, in their Navigations between one Country and another, and of refuge and ſecurity from the Attaque of Enemies, wherewith the Seas are generally incumbred: And it doth not at all leſſen the Obligation that *Trade* hath

hath to *Husbandry*; becauſe many Countries, Cities, and places thrive ſo well where Husbandry is not uſed.

For the City of *London*, notwithſtanding its great Trade, and many Noble and Wealthy Inhabitants in it and its Suburbs, cannot ſubſiſt without the Husbandry of many of the Neighbouring Counties, whoſe daily labour and induſtry in that Art, are the principal means of preſerving and maintaining that great *City*, not only in their habitations and neceſſaries for life, but in many things uſeful towards the Support of their Trade and Traffic.

And it is alſo obſervable, That where *Agriculture* is ſlighted, neglected, or not uſed, Trade is not conſiderable in ſuch places: As on

on the incultivated Coaſts of *Africa* and *America*; In ſome places whereof little is to be had by our Merchants, beſides the Skins of Wild Beaſts, or *Elephants* Teeth; and in other places nothing at all. Although the Soil may be rich, and the Countries populous, but with Inhabitants lazy and ignorant, feeding on the Productions of Nature, without any other labour or induſtry, than Hunting, Fowling, or gathering of Fruits.

In that great Kingdom of *Spain*, ſince the Expulſion of the *Moors*, *Agriculture* hath been much neglected, which hath reduced that Kingdom to ſo mean a Condition, as to its Trade, that it would be of little worth, did not other Nations maintain it, for the

the lucre of its *American* Products.

The fertile Kingdom of *Ireland*, for want only of People to cultivate its rich and vaſt Waſts and Territories, maintaineth but a ſmall Trade in compariſon of its Neighbours.

So that if it be granted that an induſtrious tilling and improving of Lands, is a principal means to beget and ſupport a Trade; and that the neglect thereof, or the inaptitude of a place for Tillage be likewiſe a means of the decay or defect of Trade; then will it not be denied, that Trade hath a dependency on *Agriculture*; and that to promote this noble and ingenious Science and Art of *Agriculture*, is one of the principal Encouragements to Trade, and will

will furniſh the Tradeſman and Mechanic, not only with all Materials whereon to imploy his Art and Cunning, but with Food and Rayment for him and his Family, whilſt he is advancing the Trade of the Nation, and heaping up Riches for himſelf and his Poſterity.

To deſcend to particulars within this flouriſhing Kingdom of *England* (our Native Soil ;) It is moſt evident, that in ſuch parts thereof, where there is the greateſt plenty of Materials to work on, and neceſſaries for the Operators, there is the greateſt Trade managed : As in *Shropſhire* and places adjacent, where there is great plenty of *Iron* and *Coal*, and cheap living for the Workmen, by reaſon of the plenty of all ſorts of

of Food, &c. which the Earth produces through the labour and induſtry of the Husbandman, Vaſt quantities of all ſorts of Iron-work uſed in Building, &c. are there made, not only to ſerve the neceſſary occaſions of many in this Kingdom, but to furniſh Foreigners withall, to the great encreaſe of the National Trade abroad.

The like may be ſaid of *Sheffield*, *Rippon*, *Bedal*, &c. in *Yorkſhire*, famous for driving the Trades of *Cutlers*, *Spurriers*, *Loriners*, &c. All which ſorts of Iron-Ware cannot be made at ſo low Rates in other places, where Meat, Drink, &c. are not ſo cheap, ſo as to maintain a general Trade to advantage, notwithſtanding there may be the like plenty of the Materials to be wrought upon: And yet

yet in theſe places of Trade the Husbandman thrives better, than where a Market is wanting. For a quick Market, although at a reaſonable price, is his delight.

Many places in this Kingdom are famous for the divers Manufactures made of *Wool*, by reaſon of the plenty of that Commodity, and of the Products of Huſbandry. For thoſe Manufactures are generally made in places where the Markets for Proviſions are reaſonable, which with the Frugality of the *Spinners*, *Weavers*, &c. ſupport that Trade. For we ſee that the *French*, who buy *Wool* here, export it with difficulty and coſt; yet by their cheap living in their own Country make it into Cloath, *&c.* and ſell it at as low Rates in Markets abroad as the *Engliſh:*

Engliſh: From whence it is not unreaſonable to conclude, that if we have our Proviſions for the Back and Belly cheaper than they (our *Wool* here being to be had at lower Rates than they can have it) we may under-ſell them in any place of the World. Therefore to maintain our Cloathing-Trade abroad, and leſſen theirs, we muſt be obliged to the Husbandman, and the parſimonious living of ſuch Mechanics that are exerciſed in theſe Trades.

And as our Husbandry brings plenty to the Market, and ſuch plenty ſupporteth and encourageth the Mechanic; ſo it likewiſe produceth many Commodities, which without any, or very little, of the aid or aſſiſtance of any other than the Husbandman and

and the Merchant, beget and maintain a conſiderable part of the Trade of this Kingdom, by their being annually exported into foreign Parts: As *Wheat*, *Rye*, *Barley*, *Oates*, *Beans*, *Hops*, *Linſeed*, *Peaſe*, *Fruits*, *Cloverſeed*, *Rapeſeed*: And alſo *Lead*, *Coals*, *Clay*, and ſeveral other ſorts of ſubterranean Commodities. And ſeveral ſorts of *Fiſh* are likewiſe annually exported, which although they are not obtain'd by *Agriculture*, yet are they taken out of our *Rivers* and *Seas* by the Labour and Induſtry of our Countrymen, and in part conduce to the advancement of Trade: Alſo ſeveral ſorts of Beaſts and other Animals are raiſed throughout the Kingdom, which are either tranſported *in ſpecie*, as Horſes,

&c. Or yield ſome Commodity for the Merchant, as *Butter*, *Cheeſe*, *Bacon*, *Ox-Bones*, *Leather*, *Coney-Skins*, *Coney-Furre*, *Wool*, *Wax*, *Tallow*, *Horn*, &c.

The *Husbandry* of *England* likewiſe produceth ſeveral Materials on which the Mechanical part of the People imploy themſelves: As *Wool* for the making of *Cloath*, *Sergos*, *Bays*, *Flannel*, *Stockings*, *Hats*, &c. *Hair*, for the making of *Hair-Cloathes*, *Lines*, *Buttons*, &c. *Skins* of Beaſts, for the making of *Shoes*, *Gloves*, &c. *Corn* and *Grain*, for the making of *Biſket*, *Beer*, *Mum*, *diſtilled Spirits*, &c. *Seeds*, for the making of Oils, as *Linſeed*, *Rapeſeed*, &c. *Iron-Oar* for the making of *Iron*, *Steel*, and an infinite number of *Tools*, *Inſtruments*, *Nails*, *Locks*, &c. made

made of that Metal; and fine *Clay* for the making of *Tobacco-Pipes*, and great variety of *Earthen-Ware*, which are glazed with our Minerals, with very many other Wares and Commodites that are either exported, as they are at first produced, or otherwise wrought into some other form by the Art of the Workman. By all which means the Foreign Trade of this Kingdom is supported, and our great and numerous Fleets trading to all quarters of the Earth maintained.

In return whereof are imported *Raw Silks*, *Camels Hair*, and *Goats Hair*, *Cotton*, *Elephants Teeth*, &c. which being wrought here into various forms, are again exported to the great advantage of Trade. It is true that the Artificers, that

for the moſt part, convert theſe foreign Commodities into Manufactures, to the great Improvement of their Value, inhabit in or near *London*, and gain much Riches by their Pains and Induſtry, where Proviſions are dearer than in the remote parts in the Country: The reaſon whereof is, that the City is the place for the Importation of thoſe Commodities, and the place where curious Artificers, as well Strangers as Natives, Inhabit; and where they have the greateſt Encouragement by their great Wages they make of their Skill and Induſtry: And the greatneſs of the Domeſtic Trade there, takes off the greater part of their Manufactures; (part thereof being exported) and for that no other Port in this Kingdom hath a Trade

a Trade ſufficient for the Exportation of ſuch Manufactures.

Another Return of our Commodities exported, are ſuch things that are neceſſary to ſupport our Healths, and add to the pleaſure of our Lives, and ſatisfaction of our Minds: As *Spices*, *Druggs*, divers ſorts of *Fruits*, *Sugars*, *Wines*, *Silver*, *Gold*, *Copper*, *fine Linnen*, *Paper*, &c. Great quantities whereof are annually imported and conſumed in this Kingdom, to the no ſmall Encouragement of Trade, and conſequently of Husbandry.

Thus by the Richneſs of our Soil, the great plenty of Mines, Minerals, Timber, Woods, Corn, Grain, Cattel, *&c.* and the Labour, Induſtry, and Ingenuity of the Husbandmen is the Trade of

England maintained, which hath made it Famous throughout the Univerſe, That it is moſt worthily eſteem'd the *Queen of Iſles*, and made it Rich and Powerful: Its Store-houſes being Replete with the Riches of the *Indies*, and other parts of the World; and its Inhabitants cloathed with the Silks of *Aſia*; Their Coffers filled with the *Metals* of *Africa* and *America*; and every one from the greateſt almoſt to the meaneſt ſolacing themſelves on the rich *Cates*, *Wines*, and *Fruits* of *Europe*, and other foreign Parts.

Therefore the more Foreign Trade is encouraged and encreaſed, the better will the Huſbandman thrive, becauſe his Commodities will be the better vended. And the more Husbandry encreaſes,

encreaſes, the more plenty will there be of its Products to ſupport and maintain that Trade. For it is the plenty and the lowneſs of the Prizes of our Native Commodities that begets and maintains a Trade abroad.

It is not the great conſumption of our own Products that encreaſeth our Wealth, as is vulgarly thought: For the more we conſume, the leſs is left to tranſport, and the Rates of it the higher, and ſo the Trade the leſs. As in Wheat and other Grain in ſuch years wherein we have plenty, and that the Prizes are low, much is exported, becauſe our Merchants are able to underſel others in Foreign Markets. And what quantities ſoever are vended abroad we have ſuitable Returns

for the ſame. Now were there any contrivance in a plentiful year of Corn, to make a Conſumption at home of a part of that Crop, whereby to enhance the prizes to the enriching of the Farmer; this would be ſo far from being an enriching of the Nation, that it would manifeſtly appear to be a loſs. For it is not the gain of the Husbandman, in his ordinary way of Husbandry, by the riſe of his Commodity; nor of a Tradeſman in his ordinary way of Trade, that enriches the Nation. As in this preſent year 1688. this Nation is bleſſed with a double Crop of Wheat, and a plenty of all other Grain. Now to export a moyety of this Crop, would very much advantage the whole, when a Conſumption

ſumption at home would only a few.

It is not the burying of our Woollen that advantageth the National Trade, but would rather be a prejudice to it, by conſuming ſo great a quantity of that Commodity; were it not that it prevents the Conſumption of the like quantity of Foreign Linnen. For the more Wool our Flocks yield, and the lower the price of it is, and the cheaper our Proviſions are, the *Clothier* can the better afford his Cloaths at a reaſonable rate to the Merchant, and he the better diſpoſe of them in a foreign Market. The like may be ſaid of all other Growths and Manufactures.

But here it will be objected, that when Wool is at a low price,

Foreigners

Foreigners buy it, tranſport it, and convert it abroad into Manufactures, and by that means underſel us, to the great prejudice of Trade: To which may be anſwered, That it is our faults that we cannot work it, ſo as to afford a better Pennyworth than they: And ſome of the Reaſons why we work not ſo cheap as Foreigners do may be theſe:

Firſt, Our Land is very fruitful, and yields more encreaſe for ordinary Food, *&c.* than there are Inhabitants to conſume it, which begets a Lazineſs in the meaner ſort of People in many places, that they will not work hard, becauſe eaſie Labour will maintain them: As on the contrary may be perceived by the more Induſtrious (for all are not Lazy, nor

nor is it a Diſeaſe in all parts of the Kingdom,) who by their Labour in ſeveral Mechanic Trades, as well as by Husbandry, do not only maintain their Families, and bring up their Children to work, but encreaſe in Riches, laying up for their Poſteritities: Which Indicates

The ſecond Reaſon, *viz.* Want of Inhabitants: For were there more Hands, more Work might be done, more Proviſions ſpent, to the Incouragement of Huſbandry, and there would be more Husbandmen imployed; that inſtead of raiſing the prizes of Tillage, *&c.* there would be a greater plenty. For our Lands, if well tilled, would in all probability yield Proviſion enough for three times the People more than now

now it doth. For if there were more People, they must work cheaper; and if Provisions were more plenty, they might the better afford it. And in case that People were multiplyed, by consequence Trade would encrease, and Laziness decrease, it being only the Richnes of the Country, with the paucity of Inhabitants, that begets so great a Pigritude: No places yielding more *Commoners*, *Vagrants*, or idle People, than those parts where no public Trade is managed; Imployment attracting People, and People expending the encrease of the Earth, which begets a quick Market, the Joy of the Husbandman; and the better the Land is tilled, the more plenty and cheap the Product is.

There

There are other Reaſons why our Manufactures of Woollen, Linnen, *&c.* are not Wrought ſo cheap here as in other Countries, and why our Country is not more peopled than it is, which have been at large ſet forth by others; and the treating of them, and the removing ſome Impediments to Trade, appertain to others, and not to a plain Ruſtic. Only here may be obſerved, That the Prodigality of our Gentry and Citizens, and the great Conſumption of our home Commodities, Manufactures and Proviſions, which ſeemingly are the occaſions of great Returns, and encreaſe of an Inland-Trade, and the enriching of many private Tradeſmen and others, is not in any wiſe profitable to the whole:

But

But on the contrary, Parſimony in all our Neceſſaries, whether Foreign or Domeſtic, is moſt advantageous to the Kingdom in general; for the leſs of our own we conſume, the more we have to ſell to our Neighbours, and the cheaper; for Plenty and low price attracts a Trade; and the leſs of Foreign we conſume, the more of their Coin or Bullion would be brought in Exchange for our Commodities: So that inſtead of the Surpluſage of their *Wines*, *Fruits*, *Silks*, &c. more than we need, our *Bullion* would encreaſe. For it was the overbalance of our home Commodities and Manufactures exported, to ſuch that were imported, that from time to time brought into our Hands thoſe vaſt quantities of

of Gold and Silver, that for the plenty of thoſe Metals we ſeem to Vie with the Maſters of the *Indian* Mines; and it is the continuing of ſuch an overbalance that muſt maintain that Import, and the defect thereof may in time occaſion the Exportation of the ſame Riches. As ſometimes hath happened, that in a year of ſcarcity of Corn here, which uſually happens once in 10 or 12 years, that we are forced to buy of our Neighbours. Their plenty draws great Sums of ready Mony out of our Pockets, becauſe we want more of their Corn than they of our Manufactures, or other Wares.

Therefore to conclude this ſhort *Preface*, My advice is to the honeſt Husbandman, to Educate his

his Children to Labour, and to Live ſparingly; and to the Tradeſman to be diligent in his Calling, to the encreaſe of the Manufactures of the Nation. And to all others (to whom Honours, Preferments, and Eſtates have not deſcended, whereby to maintain or employ them in Higher or other Capacities equally neceſſary to ſupport Order, *&c.*) To employ themſelves and their Stocks in managing of *Agriculture* or Trade. And to propoſe and find out the moſt eaſie and frugal ways of doing ſuch things that now require great coſt and labour to accompliſh. As in making Rivers Navigable to facilitate that troubleſome way of Carriage now uſed, which in many places may be done.

In

In making Wains, Carts, Ploughs, *&c.* to be drawn with leſs ſtrength than now they are, in making High-Ways more paſſable, and in erecting Bridges, *&c.* for the fewer Cattel are employed in Husbandry, the more may be ſpared to ſend abroad; and the fewer hands uſed thereabouts, the more may be ſpared for Mechanic Arts; for it's much more profitable to Export our Commodities wrought than unwrought. For the making of the ſeveral Rivers Navigable to *Oxford*, *Guildford*, &c. hath conſiderably added to the Husbandry and Trade of thoſe Towns, and leſſening humane Labour within theſe few years. The uſe of Waggons inſtead of Pack-Horſes, where they could be uſed, hath much abated the price

of Carriage. The use of Stage-Coaches hath likewise given a greater liberty for People to travel through most of the great Roads of *England*, to the great encrease of Trade. And the Womens use of *Pattons*, a seeming inconsiderable Invention, hath saved the wearing of a great deal of Leather, whereby there hath been much the more of it to be spared for Exportation wrought or unwrought. The *Saw-Mill* on the *Thames*-Bank, hath, by the force of the Wind, done the work of many hands, which is much to the Public advantage. The like would any Instruments be that could but lessen the labour of Man or Beast.

If all our Corn were to be beaten in Mortars, as in *Hesiod*

time, inſtead of being ground in a Mill; and all our Wares, Goods, &c. carried from place to place on Horſe-back, as in ſome places now it is inſtead of in Waggons or Carts, and all the Water carried from its Fountains to the reſpective houſes in or near *London*, as for the moſt part it was before the *New-River* was made, and the various Engins erected to convey it from the *Thames*; what a vaſt number of People and Horſes muſt be then imployed?

It is true, it would maintain a great number of People, and beget a very great private Trade to ſome People in ſome places: But would very much leſſen and impoveriſh the Trade of the Kingdom in general.

Here it will be objected, that heretofore before many of these new Inventions, we had a great foreign Trade. To which I will only answer, That then our Neighbours were not so ingenious, nor so much addicted to Trade as now they are; for had not we hitherto kept pace with them in Ingenuity and Industry, they had long since devoured our Foreign Trade: Therefore as they thrive, we must emulate them. For Divine Providence hath seated us on an Island yielding all sorts of Necessaries, Mineral, Animal and Vegetable, for the promoting and carrying on of Trade: Having many secure Ports for the Encouragement of Trade. And its temperature of Air and situation on the Globe such, that it exceeds all

all other places whatſoever yet diſcovered: That if its Husbandry be neglected, and its Trade decayed (which neceſſarily follows) it muſt very much reflect on the *Genius* of its Inhabitants, which to do, there hath been hitherto no cauſe: No Nation under the *Sun* producing ſo *Ingenious*, *Active*, *Valiant*, and *Wiſe* a People for the Management of their Trades and Occupations at Home, and ſpreading their Colonies and Factories, and multiplying their Effects abroad.

One of the great Advantages to Husbandry and Trade of *England* is, that there is not a Vill in it but is ſituate within 20 Miles of the Sea, or ſome River Navigable, or that may be by Art and Induſtry ſo made, whereby

carriage of heavy Commodities useful in Foreign or Domestic Trade may be cheap: As Timber, Stone, Coal, Corn, *&c.* which not only easeth the labour of many Hands, sparing them for other uses, but the better furnisheth all Markets with such Commodities they want of their Neighbours.

Therefore the cutting and making of Rivers Navigable, is very much to be encouraged, as of Public Use and a National Advantage, and so hath it been esteemed in Foreign Countries. The Navigation on cut Rivers advancing the Trade of many rich Cities and Towns in the *Spanish Netherlands*, and *united Provinces*, usually called *The Low Countries*. And great have been

the

the Attempts of Emperors and Princes abroad in cutting Channels, uniting of Rivers, *&c.* As in cutting a paſſage between the *Mediterranean* and the *Red-Sea*: The making Navigable the *Iſtmus* of *Corinth*, thereby to make ſafe and ſpeedy paſſages from one Sea to another. Attempts have been likewiſe made to unite great Rivers, as the *Loire* and *Seine* at *Briare* in *France*, the *Soane* and the *Moſella* on the Confines of *Burgundy*, and the Rivers *Redintz* and *Altmul* near *Regensburg* in *Germany*, began by *Charles the Great*, which had it been perfected, would have opened a Navigable Paſſage from the *Rhine* to the *Danube*.

But the greateſt Work that hath been attempted and per-

formed, is the cutting the *Royal Canal* of *Languedoc*, making a Navigable passage from the Port of *Cette* on the *Mediterranean Sea* into the *Garronne*, which emptieth it self into the Western Ocean, which is esteem'd not only the greatest and most stupendious Work in *France*, but of the whole World. It was first proposed by Cardinal *de Richelieu*, began in the year 1668. and carried on with great Skill, Cost and Industry, and finished *Anno* 1686. The length of the *Canal* is said to be 50 or 60 *French* Leagues in length, and in breadth 12 or 15 fathom, that Vessels of good Burthen may pass easily; its depth about 8 or 9 Feet.

This *Canal* hath its supply of Waters from several Rivers by

other *Canals* made to convey them into this *Channel* of Communication between the two Seas. Besides which there are great Treasures of Water coming of other *Streams* of *Rain* and of *Snow*, reserved to supply any defect of Waters that may in times of Drought happen in the *Royal Canal* or *Channel* of Communication: This *Canal* is also carried by a Stone-Bridge over another Navigable River; and in another place it passes through a Hill in an arched passage of 26 fathom in length: In this *Canal* are said to be 23 *Locks*, all of Stone-Work, for the raising of the Vessels, I suppose as they pass from the *Mediterranean* towards the *Garronne*; for it is to be supposed that the Sea at *Cette* or

Mont-

Montpelier, is equally or very near level with the Sea below *Burdeaux* at the Mouth of the *Garronne*. And it is evident, that the *Garronne* from *Tholouſe* runneth at leaſt five times farther than is the diſtance between it and the *Mediterranean-Sea*; and the *Garronne* is upon a continual deſcent, and becauſe there is a ſufficient ſupply of Waters, Veſſels may paſs without help of *Locks*: But the *Royal Canal* having only Water to preſerve it full, muſt be made level, and its deſcents towards the *Mediterranean-Sea* muſt be by Artificial *Locks*, and in number as is their depth, and the declination of the Country. By this *Canal* may be tranſported all Commodities from the *Mediterranean-Sea* to *Burdeaux*, and all that

that Coaſt of *France*, and ſo by conſequence to the Northern parts of *Europe*, without the hazard of paſſing the Streights of *Gibraltar*, or fear of *Turkiſh* Pirats, beſides the eaſie carriage of *Wines*, *Corn*, *Oil*, &c.

I only mention this particular Work, to ſhew that great things may be accompliſhed, where *Intereſt*, *Honour* or *Glory*, excite great Men to aid and aſſiſt in ſuch Enterprizes.

We have here in this Kingdom ſome Inſtances of extraordinary Actions of this Nature, which have been formerly done to the Honour of the Undertakers, and very much to the Advantage of the places where they have been done, and conſequently to the Nation in general: As the makng

the

the River of *Thames* Navigable from *Abington* to *Oxford*, and then farther towards *Lechlade*, hath proved of very great Advantage to that *City* and places adjacent. The like the making the River from *Gilford* in *Surrey* into the *Thames* Navigable, hath been very advantagious to that Town and its Neighbourhood, and both of them have added much to the Trade of that Famous City of *London*.

There was once a Navigable *Canal* cut from the River *Trent* near *Torksey* in *Lincolnshire* to the City of *Lincoln*, where it joyned to the River that flows from thence to *Boston*, and was supplied with Water from that River: It was said to be done by Bishop *Attwater*, or *Henry* 1*st*, as some will

will have it. However it was an ancient Work, as its Name imports, being called *Foſſedike*, and is viſible to this day; although wholly uſeleſs, perhaps ſuffered to decay by reaſon the Advantages ariſing thereby might be but ſmall, *Trent* and *Boſton* being neither far from *Lincoln*, or perhaps when the Trade of that City decayed (which hath been heretofore very great, as hath been ſaid) this *Canal* was neglected.

But the greateſt Work of this Nature that hath been done in this Age in this Kingdom, was the cutting that famous *Aquaduct* from *Ware* to *Iſlington*, whence by Pipes its Water is conveyed to the greateſt part of *London* and its Suburbs. A Work not only eternizing the Fame of the

Undertaker

Undertaker, but of infinite advantage to his Succeſſors and that great City.

It is not impoſſible ſo to enlarge it as to make it Navigable for Wherryes and ſlender Barges, for the paſſage of Men and Women, and the eaſie carriage of all manner of Commodities to the Markets of that great *Metropolis*, and the return of Coals and other Goods back again. For there is Water enough in the River *Lea* at *Ware* to maintain a full Channel all the year, to carry Veſſels of good Burden, and to maintain currents of Water in moſt of the principal Streets of the Famous City of *London*, which would not only keep them clean and wholeſome, but be ready on all occaſions if ſudden Fires ſhould happen.

There

There are many other *Rivers* that either flow into the *Thames* or other (already made) *Navigable Rivers*, or into the Sea, that may be made Navigable, to the very great advantage of the adjacent Towns and Countries, and of the general Trade of the Kingdom. For it is moſt certain, where there is Water enough to make a full Channel, and ſupply the conſtant Expence and Leakage of the Locks, the making of ſuch River Navigable will be feazible; notwithſtanding the deſcent or fall of the River be quick: For where the deſcent is quick, as from *Salisbury* to *Chriſt-Church*, and from *Wincheſter* to *Southampton*; although there be plenty of Water, yet it is uſually broad and ſhallow, and therefore not naturally

naturally Navigable, nor to be made so without many *Locks* and artificial *Canals*; for the Current will otherwise be so strong, that laden Vessels are not easily haled against it: Such Rivers require too much cost for a private Purse to undertake to advantage. But if there be Water enough, as in many Rivers in *England* there is, and the descent not too quick, *Locks* will raise Vessels into the new-cut *Canals*, through which, although heavy laden, they will pass with ease. It is observed, that the Water descends from *Brussels* to *Antwerp*, above 200 Foot, yet is that River Navigable by the help of *Locks*: And that at *Fontain*, four or five miles from *Brussels*, one River is by Art carried over another for Navigation

gation-sake. It's the easie carriage of Goods from one place to another that makes so many and rich Cities and Towns, and Trade flourish in those Countries, and without doubt would do the same here.

It is not the setting down the Expence of making a River Navigable, and then setting down the Income of the Toll, and so casting up, Whether it will bring in as much *per annum* as the Interest of the Mony to be expended amounts to, that will make Rivers Navigable. If those Expences had been rightly cast up, the River from *Ware* to *Islington*, and that from *Guildford* to the *Thames* had not been yet begun: Although there be twenty times the Interest of such Expences advantage to some or other, besides the

Public. Therefore ſuch great Undertakings where ſo many are concerned in the Profits, ought to be at the Expence of many: As the Reparations of ſome High Ways, Bridges, Havens, *&c.* have been at the Charges of more than the adjacent Inhabitants, becauſe the Profits extend farther.

It hath been a long time under Conſideration, and ſeveral have pretended to be Undertakers of it, *viz.* The Uniting of the River of *Thames* with that of *Avon* that flows to *Briſtol*, making a Navigable Communication between the Cities of *London* and *Briſtol*. The poſſibility of accompliſhing this Enterprize hath been much argued, and I will not here contend againſt it, ſuppoſing the ſame may be done, ſo that there be Water enough to ſupply ſuch

a *Na-*

a *Navigable Canal* that muſt be made between the Heads of two ſmall Streams that lead to each River, which will be very difficult to be had, where there is no other Stream or River near, to be brought into it, to ſupply it. For it is not a little Water that muſt maintain ſuch a *Navigable Channel* in the Summer-time, and the Leakage of the Locks at each end, which muſt be for raiſing up and letting down of Veſſels, that ought daily to paſs through this *Channel*; and in caſe there ſhould be a conſtant ſupply of Water, yet would the Expence of making ſo many Locks as would neceſſarily be required on thoſe ſmall Streams, be ſo great, that it would be inſupportable, or at beſt very unprofitable to private Purſes. For a ſmall Stream hath a

much quicker descent than a large and heavy River, for this worketh it self into a level, there being not so great a descent from *Kingston* upon *Thames* to the shore at *Putney*, as is usually in a miles length of a small River; besides small Waters are uncapable of Navigation, unless pent up to a level. But without doubt if this Work were done (in case it be possible to be done) it would be of very great use and advantage to all that Trade between those two Cities, and an enriching of several Countries adjoyning to the said *Channel*, as well in their Husbandry as Trade.

The making of Rivers Navigable being at the first, a Work of great Expence, is too much for private Undertakers: Therefore if there were a Fund of 20 or

30000

30000 *l. per annum* raiſed out of ſome foreign Commodity, or on *Coals*, or the like, to be applied for that purpoſe, In a few years time many Rivers in *England* might be made Navigable, whereby *Coals* and other Marine Commodities might be imported to; and Timber, Wood, Stone, Corn, *&c.* be exported from the more Inland-parts; and a ſmall Impoſition on each Barge or Veſſel would be ſufficient to maintain the Locks and Canals in repair; which would prove a very great Incouragement to Husbandry and Trade: As appeareth in all places ſituated near a Navigable River, where Farms yield good Rents, and yet plenty of all things abounds: That all places may partake of the like Felicity, is the deſire of all true *Engliſhmen*.

The

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CHAP.

CHAP. I.

Of Husbandry and Improvements in general; plainly discovering that there is a ſpontaneous generation and growth of Vegetables and Animals.

IN my former Treatiſe of this Subject, and the firſt Chapter, I diſcourſed ſomewhat of the Matter or Eſſence of Vegetables, from which they receive their ſubſtance, That inexhauſtible Treaſure from which the Husbandman, by a proper application of his Seed, extracteth ſo great Riches: I will now make ſome ſmall addition to that Chapter, in oppoſition to an Aſſertion ſometimes made; which is, That every Plant

is propagated by its proper Seed; And, That Nature produceth nothing ſpontaneouſly.

That there are ſpontaneous productions of Plants.

Now what can be more plain, Than that every part of this Globe of Earth (where the perpendicular Rayes of the ſcorching *Sun*, or the defect of thoſe attracting beams in the *Frigid Zones*, or the great quantities of *Egyptian* or *Lybian* Sands prevent not,) affords its larger Foreſts, Woods, Groves; Or its leſſer Shrubs; Or its fertile Plains, replete with great variety of ſmall Vegetables, ſome as Medicines, others as Poyſons, ſome as Food, others as Rayment to their reſpective Inhabitants, and for Paſturage to the numerous Herds and Flocks of Cattel and other leſſer Animals feeding on them, without being planted in ſuch places by Humane Induſtry, or the Seeds tranſported in the Air to ſo remote parts. The Weſtern Iſlands alſo that lie remote from the *American* Continent, although uninhabited by Humane Race, yet afforded to the firſt Diſcoverers large Woods and fruitful Paſtures, which fed our European Cattel when put on ſhore, and on which they multiplied and proſpered exceedingly; ſuch Vegetables that were ſo far from

rom being propagated by Seeds carried hither in the Air, or by any other means, hat the Species of ſome of them are not o be found in other Countries.

The Hiſtories of the firſt Diſcoveries of the Weſtern Continent, and the Iſlands emote from Land on every ſide, will urniſh you with variety of Examples of his nature.

Beſides, there are many Plants that are pontaneous only at certain Seaſons, and ot at other, according as the Recepta- le or Matrix of the Earth is enclined; or ſometimes over-much moiſture, in a et year, cauſeth Land to emit other lants than before it did in dry years; and he laying of dry Land wet, or wet Land ry, very much altereth the Species of egetables that ſpontaneouſly proceed rom it.

Mr. *Evelin* in his Philoſophical Diſ- ourſe of Earth, gives an account of what Dr. *Moriſon* affirmed of the Plant *Eryſimum* or *Irio*, that after the Conflagra- ion of the City of *London*, more of it ppeared amongſt the Ruines, than was nown to grow in all *Europe* beſides: It eing (as he ſaith) a curious *Exotic*, to be

found most about *Naples*, and but rarely elsewhere.

Examples of this nature are many where after the felling of one sort or Species of Wood another hath succeeded, and where Land that hath been frequently sown with one sort of grain, hath produced other grain than what hath been sown.

The same Mr. *Evelin* in his most excellent *Discourse of Forest-Trees*, relates from a Person most worthy of Credit, *That in the Territory of* Alzey *(a Country in Germany, where they were miserably distressed for Wood, which they had so destroyed, that they were reduced to make use of Straw for their best Fewel,) a very large Tract being newly plowed, but the Wars surprizing them, not suffer'd to sow; There sprung up the next year a whole Forest of Pine-Trees, of which sort of Wood there was none at all within less than fourscore miles.*

Some assert that all Plants are produced of Seeds.

Many other Relations there are in *Pliny*, and other Authors of the like nature, which I need not mention; Only here I cannot but take notice of the far fetch't Cause of such unexpected productions of Vegetables some have given,

viz. That becauſe God ſaid, *Gen* 1. *I have given you every Herb bearing Seed, and every Tree in the which is the fruit of a Tree yielding Seed:* Therefore all Vegetables are produced and multiplied of the ſeed of the ſame Species, and by no other ways, and deny all ſpontaneous Productions. And to back this Aſſertion, have found out a way whereby the ſeeds of all Vegetables may be conveyed from one Country to another, *viz.* by the Wind, from whence their Species may be renewed or propagated *de novo* in places where formerly they have not been known. And imagine that the Showers of ſeeds mentioned by *Pliny* in *lib.* 16. *cap.* 33. *&* *lib.* 19. *cap.* 3. were firſt exhaled from Trees or Plants of the ſame kind; and to make this ſeem more probable or eaſie to obtain Credit, they have diſcovered that there are ſeveral Plants that produce ſeed, which formerly were reputed barren; and thoſe ſeeds ſo ſmall that with the Wind they may eaſily be tranſmitted from place to place at a very great diſtance, whereof Mr *Hooke*, *Fellow of the Royal Society*, in his little Tract, intitled *Lampas*, gives you ſome inſtances. As that Obſervation of his own about

the ſeed of Moſs, which with his Micro-ſcope he found to be very numerous and very ſmall, that there will need no leſs than nine hundred and threeſcore thouſands of them to cover the ſuperficies of an inch ſquare; and that the number of them in a grain weight cannot be leſs than one thouſand three hundred eight and two millions: Theſe ſeeds he ſuppoſeth may eaſily be drawn up into the Air and carried from place to place, even to the tops of the higheſt Towers, or to places moſt remote, and be ſown by the paſſing Air, or falling drops of Rain; and that it is not in the art of Man to leave Earth expoſed to the common Air and to exclude the entrance, or pre-vent the ſowing of theſe imperceptible Seeds.

Another was an Obſervation of Mr. *C.* of *Briſtol* about Fern-ſeed, which he found to be likewiſe very ſmall, and numerous, and that the little Boxes containing the ſeeds were in moſt of the Plants not half, and in ſome not above one third, or one quarter as big as a very ſmall grain of common white ſand; and that ſome of thoſe bladders contained about 100 ſeeds, which were ſo exceed-ing

ing ſmall as to be wholly inviſible to the naked Eye, and indiſcoverable without a Microſcope.

I will not gainſay theſe curious and ingenious Obſervations, nor queſtion them. But theſe do not at all manifeſt that all Plants are produced of ſeeds taken from the ſame Species. For how could the Wind carry the heavy, though ſmall ſeeds, of Purſlane from the Continent above 1000 miles over the Seas to the Iſland *Santta Helena*, where at the firſt diſcovery thereof it plentifully grew; and the ſeeds of the *Cedar* from Mount *Libanus*, or any other Continent, to the Iſland of *Bermudas*, where ſo great Woods and Groves of it were found at its firſt diſcovery? Or how could the Seeds of the various kinds of Graſs be wafted over ſo large Seas into all places, almoſt throughout the World, by the Air only? For although the ſeeds of them are but ſmall, yet have they their weight; and notwithſtanding they may by Hurricanes, tempeſtuous Winds, or the like, be elevated to a great height in the Air, yet have they a tendency towards the center of the Earth, and cannot long remain at ſuch a diſtance, as to be tranſ-

mitted from one Country to another, nor indeed is there any neceſſity thereof: For although every Plant may yield its ſeed by which it may probably encreaſe, yet that is no reaſon but that every ſoil may ſpontaneouſly produce ſome Vegetable it is moſt enclinable to. As ſome Seas yield *Coral*, ſome one ſort of Weed, ſome another, the like of other Waters; likewiſe ſome Plants yield one ſort of Excreſcence, and ſome another, which cannot be imagined to proceed from material ſeed, no other than the variety of Muſhrooms, Mold, *&c.* which differ according to the nature of the ſoil, or the ſeveral ſubjects from whence they grow, theſe rather proceeding from the univerſal Agent, as it is more or leſs animated by the Celeſtial Sun, and as it meets with its proper Matrix, ſo it produceth ſome Plant or other. Now the uſe the Huſbandman may make of theſe natural and ſpontaneous productions, is, that by them he may diſcover the temper and ſtrength of the ground that produceth them, that he may either multiply the ſame Species, if for his advantage, or ſuch other that are conſimilar, or avoid planting or ſowing in Land of a contrary nature.

——————Quæ robora cuique,
Quis color, & quæ rebus natura ferendis,
Humida majores Herbas alit,——
——————Piceæ, Taxique Nocentes
Interdum, aut Hederæ pandunt Veſtigia
Nigræ. Virgil.

For it is obſerv'd that where Brambles flouriſh, the Vine will proſper; and that Land natural to the Birch is not good for Apples, Pears, *&c.* That Tree delighting in the lighteſt and pooreſt, theſe in richer and ſtronger Lands. Many of the like Obſervations may the Husbandman make of the nature of his ground, and accordingly may he apply proper ſeeds or plants to the ſame.

That there are ſpontaneous productions of Animals

It hath been alſo aſſerted, That no Animals are produced but by the act of Generation, each proceeding from others of the ſame Species. But if they that are of that opinion do conſider that there is no habitable place on this Globe that is not replete with Animals greater or leſſer, and ſome places with both, notwithſtanding it doth not appear how the firſt of them came thither; They will eaſily grant,

grant, that the ſame univerſal *Agent* or *Spiritus Mundi* that never reſteth, may when it meeteth with a proper ſubject cauſe Animation, as the matter is whereon it worketh; for ſome places or things being leſs prolific or fertile are apt to Vegetation, others that are more, are apt to Animation or the production of Animals by the power of the ſame Agent. As moiſt and fruitful ſeaſons and places yield more Inſects than dry and barren. And ſtanding Pools and mature Fruits naturally afford ſmall Animals, which never were generated by others, but only by the Univerſal Agent. Many inſtances hereof might be given; for almoſt every Plant produces ſome Inſect or ſmall Animal proper to that Plant: As the Mulbery, the Silkworm, Apples, Pears, Plums, *&c.* Worms peculiar to theſe Fruits. Nuts alſo have Worms within their ſhells there generated by the ſame natural heat or ſpirit that produced the Kernel, and not from any external ſeed or Egg; for that Worm worketh its own way out of the ſhell, and then ceaſeth to be.

Mr. *W. C.* (that before gave an account of the Fern-ſeed) to the admiration of him,

him, and others with him, obſerved many differing kinds of ſmall living Creatures wholly inviſible to the naked Eye, and even through largely magnifying Spectacles, though ſome of them were to be ſeen through a deep convex Glaſs; but with a Microſcope, when the Plant was newly gathered, they might be ſeen nimbly running up and down among the ſeed Veſſels. *Lampas p.* 50.

Perhaps it will be ſaid that theſe Animals are produced of Eggs repoſited there by ſome ſmall Flyes, as the proper place or Matrix for their production; as Fleſh-flyes do the like on putrifying fleſh. But why may they not be there engendred by the univerſal Agent as well as Mites in Cheeſe, or thoſe nimble Fiſhes in Vineger, which are never obſerv'd to be transformed into Flyes, and ſo uncapable of tranſporting their Eggs from place to place?

This ſuppoſition of the ſpontaneous production of Animals out of places and things capable of impregnation from that univerſal Agent, is not contrary to, but agreeable with that Command, *Gen.* 1. *Let the Earth bring forth the living Creature*

Not contrary to the Scripture.

ture after his kind, Cattel and creeping thing. To which we will ſubjoyn the Opinion of the Learned Dr. *Stillingfleet* in his *Origines Sacræ*, Book 3. cap. 4. "It ſeems very probable (ſaith he) that "at leaſt thoſe parts of the Earth which "were thus divided from each other, did "bring forth theſe ſeveral living Crea-"tures after their kinds, which did after "propagate in thoſe parts without being "brought thither by the help of man. If "now this ſuppoſition be embraced, by "it we preſently clear our ſelves of many "difficulties concerning the propagation "of Animals in the World, and their "converſation in the Ark, which many "have been ſo much to ſeek for ſatisfacti-"on in. As how the unknown kind of "Serpents in *Braſil*, the ſlow-bellied "Creature of the *Indies*, and all thoſe "ſtrange ſpecies of Animals ſeen in the "*Weſt-Indies*, ſhould either come into "the Ark of *Noah*, or be conveyed "out of it into thoſe Countries. *And afterward the ſame Author adds*, "Beſides, ſome kind of Animals cannot "live out of that particular Clime where-"in they are; and there are many ſorts "of Animals diſcovered in *America*, and

"the

" the adjoyning Iſlands, which have left " no remainders of themſelves in theſe " parts of the World.

Therefore let them that are ſo confidently opinionated, That every thing we diſcern to have life, proceeds from an Egg; conſider from whence theſe Multitudes of *Locuſts*, *Graſshoppers*, *Caterpillars*, *Frogs*, *Chaffers*, &c. that in ſome years and in ſome Countries do appear, although at ſuch remote diſtances of time, that in caſe they were produced of Eggs left in the Earth by ſome former flight of thoſe Inſects, it will prove very difficult to demonſtrate how life could be preſerv'd in ſuch Eggs ſo many years; or elſe how the Wind could carry them from one Country to another, or out of different Climates; or how the Eggs of Inſects could be conveyed into *Nuts*, *Fruits*, *Woods*, *Stones*, &c. which frequently afford thoſe Animals: Nay, Snow it ſelf is ſaid not to be without its proper Inhabitants, although there be ſometimes two or three years interval between any quantities lying in theſe parts.

The Bodies of Men and Beaſts afford many Examples of Worms bred in the moſt inward parts, even in the Brain and Mar-

Marrow of the Bones. But where they lay their Eggs, and how they ſhould be convey'd from one to another, will be difficult to determine. Therefore when I conſider of the many inſtances of this kind that may be produced, and the difficulties on the other hand, I am the more confirm'd in my opinion, That there is ſcarce any created being that hath any thing of moiſture in it, but may be a proper Matrix for the *univerſal Agent* or *Spiritus Mundi* to act upon for the production of ſome Animal; and according as Plants are (from ſome ſuperior influence) more corrupted, ſo do they emit greater numbers of ſome ſorts of Animals or Inſects, that they become a Scourge to the Husbandman, whoſe knowledge of theſe things is not unneceſſary, that he may uſe means to prevent or cure ſuch Plagues. The prevention and cure whereof in the Tenth Chapter of the former Treatiſe is partly treated of.

CHAP.

CHAP. II.

Of the great benefit and advantage of Encloſing Lands.

IN the former Treatiſe in that Chapter of this part of *Improvement of Lands*, I gave an account of the great advantages Encloſure would produce, and the many Objections raiſed againſt it, and Impediments that hindred it, with their Anſwers and Removals. Since the writing whereof, ſeveral worthy and ingenious Men have endeavoured to promote this Piece of Husbandry, which I may truly Stile, *The firſt and principal Point of Agriculture*; For unleſs the Husbandman can at all times and ſeaſons, when he pleaſeth, uſe his Land, and plant and ſow in it what he will, and defend it when he hath done, from the common annoyances to good Husbandry; It is in vain for him to uſe any extraordinary labour, or be at any extraordinary expence, or hope for any advantage from it. So that there would be then no difference

ference between stupidity and Ingenuity, and all Industry would be hereby discouraged.

Profits of Enclosing Lands.

Some have been of Opinion, that Enclosing improves Land to a Ten-fold, others to a twenty-fold advantage; that is, that by the means of Enclosure the Husbandman may by his Industry on such Land, in planting several Hortulanes or Orchard Fruits, raise as well to the Public as his own advantage, much more than he could on open Land seldom fruitful, and subject to almost all manner of inconveniencies, as *Cicero* says, *Ager quantumvis fertilis, sine cultura fructuosus esse non potest.* There is no Country that is celebrated for good Husbandry or Ingenuity in our temperate Clime, but their Lands are divided into severals, as the rich Provinces of the *Netherlands.* The most fertile parts of *France* and *Italy*, the Garden of the World, sufficiently evince. Nor is there any place in this Kingdom flourisheth more than where Enclosures are most. The open Champain Countries and wast Lands producing multitudes of poor, ignorant, lazy and improvident people, depending so much on the small

small Priviledges and Advantages they raise out of the large Forests and waste Lands, that Hunger and Cold for the most part of the year, and Ease throughout, are sweeter to them, than Labour or constant exercise in some honest Trade or Husbandry, which might lodge, cloath, and feed them and their Families, after a far better manner than the best of such Borderers ever enjoy'd.

For any Traveller may observe that in the enclosed Countries, the Hedges are all replete with Timber and other Trees, that they are deservedly called *The Wood-Lands*, and were so called in former Ages: And not only with Timber for building, and Trees for firing, but with plenty of Fruit-Trees in the Hedges and Orchards dispersed throughout, so that these enclosed Countries afford Fruits which are carried far into the Champion, and *Cider* in such plenty, that they spare great quantities for their ignorant and lazy Neighbours. The Buildings also in these enclosed Countries, where Materials and Artificers are more plentifully to be had, far exceed those in the Champion and Forest-Lands; and Market-Towns well built and populous, standing much nearer

here than in the other. All sorts of Mechanic Trades, on which the General Trade of the Kingdom depends, are in these enclosed Countries principally managed. Here are the industrious Husbandmen constantly employed in improving their Lands, and here are Markets wherein they weekly vend the Fruits of their Labours, to the feeding and sustaining the Artificers and Trades, who best subsist in such places, where most is to be had at the easiest Rates. Now hear old *Tusser*;

More plenty of Mutton and Beef,
Corn, Butter and Cheese of the best;
More Wealth any where (to be brief)
More People, more handsom and prest;
Where find ye (go search any Coast)
Than there where Enclosure is most?

Objection. There is one grand Objection raised by inconsiderate Men against Enclosures; to wit, That Enclosing of *Wasts*, *Downs*, &c. will prove a decay of our Herds of *Cattel*, and Flocks of *Sheep*, and so by consequence, of Wool.

To

To which I answer, That if 20 *Cattel* must have 100 or 200 Acres of good waſt Land, or that 2 or 300 *Sheep* muſt have 5, 6, or 700 Acres of open *Down-Land* to depaſture on, according to the preſent uſe and cuſtom: In caſe ſo much thereof be encloſed as lieth convenient for Encloſure, half the quantity of ſuch open Lands being laid up to common Graſs, will feed more than the whole did before it was encloſed. And in caſe that ten Acres thereof ſo encloſed, were ſown with *Clover-Graſs*, *Turneps*, *Cole-Seed*, *Parſley*, or the like, they will feed as many *Cattel* or *Sheep* as 100 Acres of the ſame Land would have done whilſt they were waſt; and the reſidue may the Huſbandman convert to other uſes, or multiply his Herds or Flocks therein as he pleaſeth, and in his ſeveral Encloſures may he raiſe ſeveral Species of Paſturage, ſome for fatting, ſome for feeding, and others for preſerving his Cattel or Sheep in health, as he finds cauſe. For the only reaſon why there is ſo great a breed of Cattel, and are ſuch great Flocks of Sheep on the Waſts and Downs, is, becauſe they are not convertible to any other *Answer.*

use, or else the Husbandman is not suffered so to convert them; it being frequently observed that where the Lords will permit, the Tenants are ready, and do Till and Manure much open Lands; notwithstanding which, neither *Cattel*, *Sheep*, nor *Wool*, are any whit the dearer.

CHAP.

CHAP. III.

Of Meadow and Paſture Lands, and the ſeveral ways of their Improvements.

THE ancient Meadow-Lands in many places of this Kingdom have not born the ſame values within theſe late years as formerly they did, by reaſon of the encreaſe of that excellent and profitable part of Husbandry, the ſowing of *Clover-Glaſs*, and other ſuch like new Graſſes and Hays: Yet are Meadow-Lands in great eſteem, and yield greater Rents than Paſture or Arable; becauſe of their producing Graſs and Hay, as is known to every Husbandman, and that they yield their encreaſe ſpontaneouſly, without Coſt or Labour; and therefore are called *Prata, quaſi parata. Pliny* tells us, *Pratorum facilima agricolis cura ac minimi diſpendij*, That Meadows require the leaſt Care or Coſts of any Lands; and therefore little can be ſaid to their Improve-

ments, more than hath been said already.

Improvement of Pasture-Lands a double Improvement.

But as to the great Improvements made on dry Lands, by the sowing and propagating of new Grasses and Hayes, much hath been done, and the advantages that are yet to be made by a farther prosecution of that piece of Husbandry, are very considerable. For the encreasing of Meadow and Pasture-Lands is not only the Improvement of those very Lands; but by the Country-mans converting of so much Corn-Land into Meadow and Pasture, puts him upon a necessity of a farther improvement of more barren Lands for an encrease of his Corn. So that it proves a double improvement, as indeed doth all Improvements by altering the products of it. As converting of Pasture-Lands into Gardens, Orchards, *&c.* begets a necessity of encreasing our Pasture-Lands on the Arable: And the converting of Arable Lands into Pasture or Meadow begets a farther Improvement, by reducing our naked and waste Lands into fertile Corn-Fields: For where there is good Husbandry at the *Center*, it spreads to the

Super-

Superficies; Good Tenures, Good Trade, and a good Market, will make Husbandmen ingenious.

Amongst the several Grasses, Hays, *&c.* that have been mentioned by former Writers on this Subject, we do not find that Parsly hath been treated of as an Improvement to our Pasture-Lands, although some ingenious Men have made trial of several Acres sown with Parsly-Seed to very good effect. *Sowing of Parsly an Improvement.*

It is observ'd, that some sort of Grasses do alter the taste of Mutton, and that the sweetest Mutton is that which hath been fed on the finest and sweetest Grasses, as is experienced on the *Peak* in *Derbyshire*, and on the *Plains* in *Wiltshire*, *Hampshire*, &c. And on the contrary, the coursest Mutton is produced from the grossest Meadows, Marshes, *&c.* which later rich way of fatting Sheep, is most advantagious to the Husbandman, but doth not humour the Pallat of the Eater, so well as such Beasts that live on the dryest Mountains without water. For Sheep fatted on Clover, and the like rich Nourishment, are not so delicate meat as the Heath-Croppers; such rank feed be-

getting too great and sudden a change in the Meat. The like difference is also observed in Conies.

Sheep fatting in Turnips.

Sheep fatten very well on *Turneps*, which prove an excellent Nourishment for them in hard Winters, when Fodder is scarce: For they will not only eat the Greens, but feed on the Roots in the Ground, and scoop them hollow even to the very Skin; The *Turnep* is of hotter nature than *Clover-Grass*, and therefore more agreeable to these Cattel.

Parsley preventeth the Rot in Sheep.

But much more hot and drying is *Parsley*, even in both, to the second degree; and were it throughly experimented, doubtless would prove very good Nourishment, and not subject those dry Animals to the *Rot*, nor vitiate the tast of their Flesh so much as the other colder Food would do.

The *Rot* being a Disease occasion'd by the *Sheep* their feeding on too much cold and moist Meat, and is prevented by hot and dry: As their feeding in shady places in some Grounds, where the Dew lieth long on a certain broad *Grass*, naturally

turally enclineth all *Sheep* feeding there; to the *Rot*; and by ſuch that have to their Coſt made experiment thereof, ſuch Lands have been converted to other uſes: When on the contrary, the feeding of *Sheep* on *Salt Marſhes* and *Brackiſh Grounds* preventeth the *Rot*, and the giving them *Salt* with their dry Meat, is eſteem'd a Cure of that Diſeaſe.

Therefore *Parſly* (being of ſuch a *hot*, *dry*, *ſaline*, and *Anti-Hydropical* nature, and as my Relators aſſure me) ſo much deſired by *Sheep* (as I am ſure it is of *Conies*, much of the nature of *Sheep* in reſpect of their feeding) may very probably be, not only a very good ſecurity againſt the *Rot*, but may render the Meat rather better taſted than any other food what ſoever.

And it is a Plant very eaſily propagated, and the Seed plentifully obtained; few Plants yielding more, and that alſo eaſily ſeparated from its Stalks: The Ground the finer it is dreſſed, the better will the *Parſly* ſown therein grow and proſper; and it will endure the hardeſt *Winters*, and continue more than one year; but how many, a careful Improver will quickly diſcover: And of what particular

ticular Uses and Advantages this Piece of Husbandry may prove (besides the general way of feeding Sheep) an ingenious Husbandman will soon find out.

Improvements by Cole-Seed.

The sowing of Cole-Seed for the sake of the Seed hath been always esteem'd a great Improvement of strong and moist Lands. But of late it hath been found that the depasturing the green Herbage thereof hath considerably advantaged the Husbandman. A particular Example whereof is related in Mr. *Houghton's Collection of Letters, for the Improvement of Husbandry and Trade, viz.* Of one that sowed six Acres of ground which he ploughed and ordered as for Wheat, with *Cole-Seed* about *Midsummer*; about the beginning of *November* he put an hundred Ewes into his *Coleworts*; The Ewes all cast their Lambs before *Christmas*. The *Coleworts* so fed these Ewes and Lambs, that he sold them at a great Rate, and when the growth was eaten up close, he plowed and sowed his Lands with Oates, and had eight Quarters grown on every Acre.

To sow *Cole-Seed* for the Pasture-sake there's no need that the Land be so rich and

and moiſt as if it were for Seed, only that it be good Wheat-Land. It maketh a good Lay for other beaten Grain; for undoubtedly it kills Weeds, and the depaſturing Sheep on it much meliorates the Land. That which is ſown about *Midſummer* for Seed, gives you not its encreaſe till the next *Summer*, but this the firſt *Winter*. Theſe Improvements of Paſtures by *Parſley*, *Turneps*, *Cole-Seed*; nor that by ſowing and feeding of Buck-Wheat, mentioned in the Fourth Chapter of my former *Treatiſe* of this Subject, are not yet brought into publick uſe; but may prove very advantageous to the skilful and induſtrious Husbandman, and conſequently to the Kingdom in general.

CHAP.

CHAP. IV.

Of Arable Land and Tillage, and of the ſeveral Grains, Pulſes, *&c. uſually propagated by the Plough.*

Mowing of wheat in the Graſs.

IT hath been obſerv'd, that in a warm and ſhowry Spring, Wheat in rich Lands hath grown exceeding Rank, that the Husbandman hath, for the benefit of his Wheat, early in the Spring, depaſtured his Sheep on it to abate its growth and weight, which otherwiſe would be apt to lodge. But of late ſome (who have found that expedient too weak, where the Wheat hath grown too faſt, or that they have not had Sheep enough proportionable to their large Wheat-fields to feed it down) have mow'n their Wheat, yea as late as the end of *May*, when it hath been almoſt ready to Ear, after which the Roots would emit new Stalks more in number, though not ſo ſtrong and rank as the former, nor ſo apt to lodge. For the extream weight and rankneſs of the Corn would have un-

unavoidably made it to lodge, which begat a neceſſity in the Husbandman to try this way, elſe he might have loſt his whole Crop; for Wheat lodging when it firſt begins to ſhoot its Ear, rarely ever ſtands again. Many in the rich *Vales* of *Berk-ſhire* did ſo mow their Wheat in the Year, 1683. it proving an early and ſhowry Spring: As to the effects I had no account of them; which I queſtion not but that they were anſwerable to their Intentions: For all Vegetables tend to ſemination; and the more you depreſs or take off the firſt ſhoots of any Fruit or flower-bearing Plants, the more will they multiply their proper Productions, or at leaſt will emit new Bloſſoms, Fruits, Flowers, *&c.* As hath been obſerv'd in many *Hortulanes*, as *Roſes*, *Strawberries*, *Beans*, &c.

Rath-ripe Barley.

There are divers ſorts of Wheat which I have mentioned in my ſaid former *Treatiſe*, and more are ſince taken notice of; of which there is one ſort that carries divers Ears on one Stalk, but not yet common. But of Barley I hear of few more than two ſorts: The common which is univerſally known in this Kingdom,

Kingdom, and that called *Patney* or *Rathripe Barley*, which is sometimes sown in *Wilt-shire*, *Berk-shire*, *Oxford-shire*, and some part of *Cornwal*, and in few places else, notwithstanding the advantage of its early ripening, it having many times been sown and returned to the Barn again in two months time, always in nine or ten weeks time at the farthest; which in wet and backward Springs, and moist Autumns, must needs prove a great advantage to the Husbandman. For in some years a very dry Spring may postpone the Season for sowing this Grain, or a man may not have time, without a double strength, to sow the common Barley before the Season for that be quite spent; or the former part of the Harvest-time may be fair, when the later is foul; in either of these cases the sowing of this quick growing Barley may be considerably advantagious; or at least that where a man hath much Land in his Occupation fit for this kind of Grain, he may, instead of making his Seed-time and Harvest near about a time, for the common sort, use so much of this *Rathripe Barley*, that his Seed-time may be longer and more ease, and his Harvest the

the like, and withall more certain. There is a ſort of *Barley* that is reported to be newly diſcovered, by an ingenious mans accidentally lighting on an *Ear* that had ſix Cheſts or Rows of Corn on it, which he ſowed, and thereby raiſed a quantity, all bearing the like *Ears*, which is likely to prove a conſiderable advantage.

Making of Malt.

Whilſt we are now diſcourſing of Barley, it will not be amiſs to ſay ſomewhat concerning Malt, that being the moſt conſiderable Grain uſed for this purpoſe. Many Ages ſince hath Malt, made of Barley, been uſed for the making of Ale or Beer; elſe could not *Pliny* have given ſo great Commendations of this Drink above 1600 years ſince. Therefore whoever he was that firſt found the Art of making *Malt*, and (of that) good *Ale*, ſhewed himſelf to be a far greater Philoſopher, than he that firſt ſqueezed the Grape.

Although that making of *Malt* is become a common Trade in moſt of the principal *Towns* in this Kingdom, and many are exerciſed in that Trade, that do not apprehend the Reaſon why the Malting

Malting of Corn ſhould make it yield a Better and more acceptable Drink than the ſame Corn would have done before it had been malted. It will not therefore be amiſs in this place a little to Philoſophize on that Subject; For it is moſt evident, that the Meal or Flower of any Corn or Grain unfermented, being concocted in a proportionable quantity of Water, will make a glutinous or mucilaginous matter. As *Laundreſſes* uſually make their ſtiffening Liquors for their Linnen, of Starch, which is only the Flower of Wheat reduced into that form; and in caſe there be no more Water added than will make it up into the form of Bread, and ſuch a maſs be baked without fermentation, it cometh forth like a lump of Clay, ungrateful to the Pallat, hard of digeſtion and unwholſome; ſo that neither Bread nor Drink made of Corn, without Fermentation, could ſatisfie our Anceſtors, which excited them to the diſcovery and uſe of Fermenting of their Bread-Corn by Leaven, and ſince that by Yeſt, which is no other than the ſcum of Ale or Beer made of malted Corn. Malting being no other than a fermentation of Corn, making it yield

to

to the Brewer its Spirit and Tincture, pleasant to the Palate and wholesome to Humane Bodies; extractions or decoctions of unfermented Grains being pale and not tinged or coloured, as are those of malted or fermented.

The imbibition or steeping of Barley in Water for 2 or 3 days or more, as the Season requires, hath this operation that it relaxeth the viscous matter of the Grain that defendeth and preserveth the life that is in it, from Heat and Cold; for as long as its Viscosity remains, the Grain or Seed is capable of Vegetation; but when by age or other accidents that is decayed, it becomes a dead Body; For such relaxation must be made in all Seeds sown in the ground, by the moisture they find there, before they can vegetate or encrease.

Now after the Malster hath steept his Barley its due time in the Cistern, (for it must not lie there too long, lest it lose its vegetating Vertue too much by dissolving its whole body into a soft substance,) Then he layeth it on a heap, where it acquireth some warmth (as all moist Vegetables will do, when lying close together,

When the Barley is in the Cistern if it be stirred well, and the light Grains that float be scum'd off, the Malt will be the better.

which causeth the Barley to emit its Root which they call *Chitting*, which the Malster suffereth to grow to a certain degree of length; then spreadeth it abroad, and by his careful turning, stirring and gradual drying his *now-making-Malt*, he prevents the overmuch growth of the Roots which now are called the *Come*, from their hair-like form; for till the *Come* is out long enough, and the Corn begin to spring, the viscous matter of it is not enough putrified, dissolved, or rather changed; and if they are suffered to grow too much, the Stalk of the Corn will shoot and extract too much of the Vertue of the Grain, leaving nothing but an empty Husk behind it,

As the overmuch *comeing* and springing of the Stalk of the Malt empoverisheth it; So its not *coming* or springing enough, leaveth it but in part malted or fermented; and so doth the unequal *coming* or *springing* of it, that is, some of the whole Grains throughly malted, and some of them not, which is occasioned sometimes by the unskilfulness or negligence of the Malster by not duly ordering his Heaps or turning the same, whereby the Corn on the outside of the Heap through drought,

drought, *comes* or ſprings not enough; and that on the inſide through warmth *comes* and ſprings too much, and ſo becomes *Acroſpired* or *Akerſpired*, by reaſon that the Stalk (here reſembling the Germinating of a growing *Acorn*, and which the Learned Dr. *Grew* calls the *Plume*) extracteth the vertue of the Grain; or elſe from the uneven growth of the *Barley*, which in ſome years from the unſeaſonablenſs of the ſeed-time becomes Ridge-grown, that is, ſome part thereof being grown green above the ground before the other part through drought be come up, yet by reaſon of ſome Summer Showers all growes to the Harveſt, where one part is ripe before the other, from the one of which Cauſes there is much *Malt* that is not good.

After the Malſter hath thus by his skill and induſtry, ſo made this Grain to ferment, that by a certain degree of putrifaction the viſcous or tenacious matter of it be relaxed; and by his nimble hand hath prevented the expence of its Noble Spirit; He then makes uſe of the third part of his skill, The calcining or drying of his Malt, which puts a ſtop to all further Germination, and makes it capable of

being preserv'd for use: But the principal end of it is to make it yield its *Spirit* and *Tincture*. This calcination or drying must be gradual, and not hasty; for the longer *Malt* is drying on the Floor before it be laid on the Kiln, the better will it be; for all hasty Calcinations waste the Spirits more than slow.

It is most certain that every Seed contains a great Spirit in it, some more and some less; For it is the Spirit in it that preserveth it, whereby it endure so much Cold, Heat, *&c.* as most sorts of Seeds usually do: And in this Spirit in the Seed is concentrated, the vertue, form, power and whole *Idea* of the Plant that produced it; else could it not by being sown in the Earth, present unto you again, another Plant in every particular like to that from whence it came. And this Spirit in *Barley* is very great, as may appear by its product; for one *Barley* Corn sown in the Earth, hath sometime produced 30 or 40 Stalks, and on them 5 or 600 increase of Seed; and by some additional improvement, a far greater; when the Seed of many other Plants produce but one Stalk to each Seed: Therefore the fermentation of this Grain by Malting is not

not an exaltation of its active Principles, as ſome would have it, but a diſſolution or relaxation of that viſcous matter that detains them, and puts a cheque or ſtop to its Vegetation, which would otherwiſe according to the Laws of Nature neceſſarily follow and exhauſt its *Spirits*; For common Water cannot be ſuppoſed to add much to the exaltation of the Spirit, or active Principles of Corn: Nor indeed can any thing add to the improvement of the high vertue that is in Seeds, but what containeth in it much of the *Spiritus Mundi*, or Univerſal Agent, As *Nitrous Waters*, *Salts*, *Dungs*, &c. or their being ſown in freſh Land that is enriched with it; For Water is but a vehicle to convey ſuch Principles: Water and the Principles being not the ſame thing.

After the *Barley* is opened and its vegetating property prevented by drying it; it is now thereby made capable of yielding its *Tincture* or *Vertue*; For the Aquoſity or Phlegme of any thing, eſpecially of a Vegetable, preventeth the extraction of its Tincture or Vertue: Therefore the drying of *Hops*, *Wormwood*, *Broom*, &c. is not only done for the preſerving them,

but for that the Liquors wherein they are infused, do the better extract their Vertue; As those that have infused the same in their *Beer* can witness. So Malt, whilst it is green, will not make Ale or Beer of that strength, as it will do when dried; And if it be but easily dried, the Ale will be paler than if it be throughly dried; and in case it be hard dried, or over dried, the deeper will the Tincture of the *Ale* be: But such over drying usually wasts the Spirits of the Malt, which are now loose, and by this Art made Volatile.

Fermentation of Mal. The Fermentation of the Meal of any Corn for Bread by Yest, Leaven or the like addition, openeth its Body and relaxeth the Viscosity that detaineth its Spirit, which is the cause that the Bread of such a fermented Mass is light, grateful to the Palate, easie of digestion, and wholesome; and if not so fermented, it becomes in every point the contrary.

The cause of roapy and windy Drink. Hence it is that *Ale* or *Beer* made of Malt not throughly malted, or of such, that part thereof is well malted, and part not, becomes *Roapy*, by having not its

its Viſcoſity wholly taken away in the firſt operation, or made by adding Oaten Malt, or Oates mixed with other Malt, whereof is that Drink made which they call Oat-*Ale*; All which is unwholeſome, cauſing Obſtructions and great Windineſs in the narrow paſſages of the Blood in Humane Bodies.

The like doth Bread or any other matter made of Wheat unfermented, or that hath undergone ſome degree of Germination before it hath been at the Mill, whereby a due fermentation is impeded. The reaſon of this my preſent diſcourſe on Malt, or fermentation of Corn or Grain, is not only to forewarn all good Husbandmen that they be cautious in eating or drinking any thing made of unfermented Corn or Grain, unleſs it be otherwiſe prepared, by due coction, or good additions, according to the Culinary Art. But alſo to excite ſuch that have *Art*, *Skill* and *opportunity* to make uſe of this Art of fermentation on ſeveral other *Grains*, *Seeds*, &c. for the extracting their ſpirits or better parts; ever varying the method of fermentation according to the nature of the Grain or Seed to be fermented; for ſome Seeds

require much longer time to be imbibed, than doth *Barley*, ere their Viſcous matter be relaxed, and ſo nevertheleſs retain their Spirits even to Vegetation; as the Seeds of ſeveral Vegetables that have undergone all the operations that Barley hath done in Malting, yet will germinate and encreaſe when ſown, as if they had never been ſo ordered; the like will ſome Grains of Barley that have not been fully ripened; and all *Barley* doth require more or leſs time and skill to malt, it according to the different Seaſons: All which deſerve the enquiries into, and conſiderations of the Ingenious.

Note that the viſcous matter that preſerves the Vegetable Spirit in all Seeds, being relaxed by Fermentation, ſuch Seed tumefy, and are thereby made more eaſie in parting with their Spirits. For Barley when it is malted, occupieth more room than it did before, although it be diminiſhed in its weight by the loſs of its duſt, (the *Come*:) And Meal when it is fermented for Bread, encreaſeth in Bulk; but without addition or diminution of its weight: So that fermentation is no other than a relaxation of thoſe Bonds that

that preſerve the vegetating Seed for production, and that prohibit the expence or waſt of its Spirits till thoſe Bonds are relaxed or broken.

Of Hemp and Flax.

I have this to add to what hath been already treated on concerning theſe ſubjects. To wit, That the Seeds of *Hemp* being ſo deſirable by Birds, and ſeeing that Pigeons in the Hemp-Countries about *Lincolnſhire*, &c. are ſo large and fat. It may probably be a conſiderable addition to the Improvement of Lands by ſowing of Hemp, to convert the uſe of its Seed to the feeding of Poultry, and other Fowl; for it is a great Crop of Seed that an Acre of Hemp will yield, beſides the benefit of the Stalks.

Benefit of Hemp-ſeed.

And in caſe ſuch Seeds ſhould give the Fleſh of Fowl fatted therewith, ſome ill Taſt, as hath been reported, yet that would be ſoon altered by feeding the Fowl 2 or 3 days before they are killed with other Grain; for ſuch a Taſt or ſavour contracted by the Food, is ſoon altered and made connatural by the heat of ſuch quick digeſters.

But the great Improvements that are to be made of Hemp and Flax, are by converting

converting the ſame into *Linnen*, *Paper*, or *Cordage*.

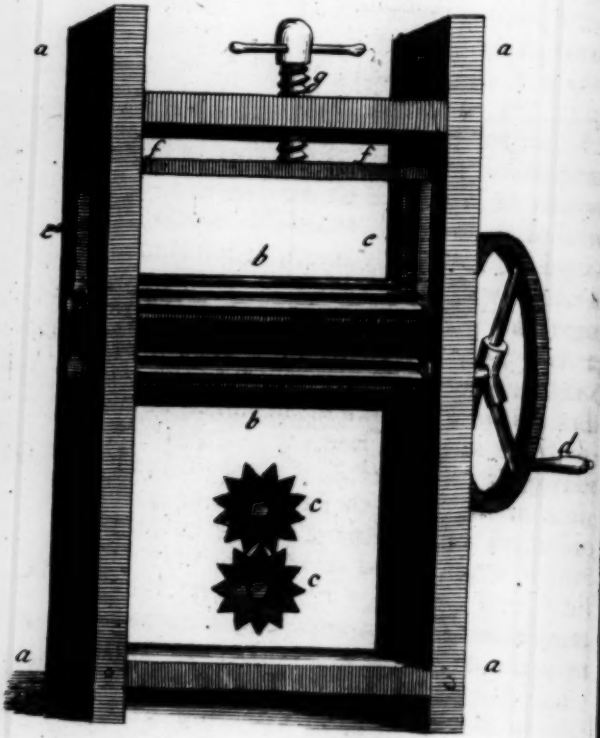
Of the making of Linnen.

The making of *Linnen* in this Kingdom would much encourage the ſowing of *Hemp* and *Flax*, but there are ſeveral Objections raiſed againſt it. The one is, That our Hemp and Flax are more hard and ſtubborn than foreign. To which I anſwer that, it doth not appear to be ſo in many places; for in *Derbyſhire*, where much is uſed and made into Cloath, it is much more ſoft and eaſie, than ſome ſorts of foreign Cloath. And if it were ſo that *Hemp* and *Flax* were hard, yet it is eaſily made ſoft, either by watering; for the long and often watering of it waſteth that gummy and glutinous matter that occaſions the ſtiffneſs that is in it, aſwel as it makes the the ſtalks or ſpills within it brittle and more eaſily broken; Or, it may be made ſoft by beating: But that being a work requiring great Labour, That it is become a puniſhment inflicted on ſome ſort of Malefactors, and by conſequence many hands and great charge are required. I ſhall here propoſe a way, that in all probability may accelerate this Work,

and

page. 43.

A Discription of ye Engine for dressing Hemp & Flax.



and very much contract the labour and pains about it; which is thus,

The deſcription of the Engine for dreſſing of Hemp and Flax.

Let there be two upright Poſts fixed as *a a a a.* at a convenient height and thickneſs, and about 3 foot apart, more or leſs as you pleaſe; let there be 2 ſolid Rolls of Beech, Elme, or rather ſome harder Wood, of about 5 6 or 7 inches diameter, and as long as is the diſtance between the 2 Poſts, as at *b b.* let theſe Rolls be toothed with 8, 10 or 12 Teeth, as you pleaſe, equidiſtant, that they may exactly ſhut the one in the other; as by the Ichnographic diſcription of the ends of them appears at *c c.* The lower Roll muſt run in fixed Sockets with a handle at one end thereof to turn the ſame as at *d.* but the upper Roll muſt run in 2 moveable Sockets made in 2 pieces of Wood that may ſide up and down, as at *e e.* within the 2 upright Poſts: Then let a Spring be made of *Eugh*, *Aſh*, or other ſpringing Wood, or of *Steel* or *Iron* well tempered, each end to reſt on the ſiding pieces, as at *f f.* which Spring may receive its preſſure from a Skrew at *g.* By the force of which Spring the upper Roll may be depreſſed

preſſed on the lower ſo ſtrongly, that Hemp or Flax may (by being drawn through between them) be far better and eaſier broken or mollified than by the ordinary Heckling. This *Engine* may be made with Handles at each end for 2 to turn; and then 4, 5 or 6 may feed it, and take it away on the other ſide to diſpoſe of it in order: And the work may be often repeated as there is cauſe. And the Spring every time harder depreſs'd by the Screw; that as in the common way the Flax is heckled three times, and every time in a finer Heckle, ſo here it may be every time harder wrought through the tooth'd Rolls, and often working it through the Rolls, will make it exceeding fine. An Ingenious Workman will ſoon make this an uſeful and profitable *Machine*, although at firſt it may not ſeem to be ſo; for any thing that is new requires patience with ſome damage to make it perfect; as every Mechanic that undertakes a new piece of Work can tell: Therefore this requires a willing, as well as an Ingenious Workman to make it compleat.

Another Objection is, that our Linnen is not ſo white as foreign: Which is anſwered

anſwered as the former; That often watering of it will make it whiter, as every Whitſter can tell: So that if Hemp or Flax be watered and beaten, it will become the more ſubtile and white. It is obſerved that in the making of the fineſt Linnen beyond the Seas, ſeveral years are required for the preparing or reducing the Flax to ſuch a fineneſs and whiteneſs; which here we deſpair of performing, unleſs we can accelerate the ſame by the ſaid Engine; For if often waſhing of Linnen will make it white, and much beating and heckling it make it ſoft or ſubtile; Its very probable, that by watering or waſhing, and often working it in this *Engine*, it may be made ſoft, fine and white.

For the difference between corſe Linnen and fine, ſeems to be in the ſoftneſs and fineneſs of the Hemp or Flax, (which is more eaſily ſpun into a ſmall Thread) and the whiteneſs of it, to which whiteneſs it ought to be reduced before it be Spun or Woven, elſe it will be very difficultly whitened after, without prejudice to the Cloath if very fine: For we may obſerve that ordinary Linnen by often wearing, waſhing and hanging abroad in the

the Air, becomes ſoft and white, but with prejudice to the Cloath, becauſe it cannot undergo thoſe ſeveral hardſhips without a ſenſible loſs or decay.

It is obſerved that frequent waſhing and wearing of Linnen makes it the whiter and finer, and that in the waſhing, Aſhes of Wood, or other Vegetables are uſed, either in the Soap, or the Lixivium or Lye, wherein ſuch Linnen is waſhed, which very much conduces to its ſoftning and whitening, which is the true meaning of what *Paracelſus* affirms in the 7th Book of the *Nature of things*, *That of Flax boiled in ſharp Lye, made of the Aſhes of Wood, is Silk made*; That is to ſay, It is reduced to the fineneſs of Silk, and equal to it in price; for there is fine Linnen equal in value, weight for weight to Silk. It is the *Alcali* of Vegetables, or the Salts of their Aſhes that are of ſuch efficacy in this Work, for the Waters which the Whitſters uſe, are impregnated with the like matter, but in ſo ſmall a meaſure, that they operate but ſlowly: But in the elevation of Aſhes, thoſe of the *Aſh*, *Beech*, or other white Woods are to be preferr'd, becauſe ſome may probably caſt a yellowiſh colour, diſadvantagious to Linnen. The

Alcali.

The principal advantage to the Kingdom that the making of Linnen here would be, is the prevention of the importing of foreign Linnen, ſome part whereof is already accompliſhed by our uſing ſo little in the burying of our dead; and in the more general wearing of *Flannel Shirts*, &c. in ſtead of Linnen, being (by far) more pleaſant, healthy and cheap, as many of our Nobility, Gentry and Commons, can by many years experience teſtifie. It is alſo another great advantage that would redound to the Husbandman in the improvement of his Lands, by ſowing Hemp and Flax, and very neceſſary in the imployment of many People, in caſe there be any place where imployment is wanting.

The want of People, I know, is the main impediment to this great deſign of making our own Linnen; for in *Derbyſhire* the common People are imployed in the Summer-time in waſhing Lead-oar, and in the Winter, when the other Imployment fails, they fall to Spinning, Weaving, *&c.* which makes our home-made Linnen ſo plentiful in thoſe parts: Therefore all ways ſhould be promoted that ſhorten the work, and leſſen the pains

pains in dreſſing and fitting the Hemp and Flax fit for the *Spinner*; And if any way there be more nimbly to ſpin the Thread, and then to weave it with more expedition, the ſame ſhould be diſcovered and encouraged. There have been Looms or Engines made to weave ſeveral Ribbons at once, that is, by the ſame labour, and in the ſame time as they uſually weave one; and ſuch Engines have been broken by ſuch that had no farther proſpect than private intereſt, which makes the Relation of the *Dantzick Invention* more credible; It was, as is ſaid, a rare Invention for Weaving of 4 or 5 Webs at a time, without any humane help: It was an *Automaton* or Engine that moved of it ſelf, and would work night and day; (being as is to be ſuppoſed, kept in motion by Weights or Water.) It was ſupreſt, becauſe it would prejudice the poor People of the Town: And the Artificer made away ſecretly (as was conceived) as *Lancellotti* the *Italian* Abbat relates out of the mouth of Mr. *Muller* a *Polonian*, that he had ſeen the device.

Another

Another use of Hemp and Flax, is for the making of Paper. The first Material that was used to write on, as we read of, was Stone, on which the Law was written. The *Sybils* Books were said to be written on Leaves of Trees; sometimes the Rinds of Trees served for that use: And for many Ages was no other Paper used, than what was made of Reeds, which grew on the Banks of several Rivers, and plentifully on the Banks of the *Nile*. *Of the making of Paper.*

But the modern Invention of Paper made of Linnen, surpasseth all in this kind, being so close compacted, so white and durable, that it may be reckoned among the singularities of Art; And it is a vast quantity thereof that is daily used in this Kingdom, in Printing, Writing, *&c.* That could it be made here, it would be of great advantage to the Nation, and in particular to the Husbandman. There are two objections or difficulties that lie in the way; The one is, That there is not old Linnen enough in *England* to be easily had for that purpose; for Paper hath hitherto derived its pedigree from the Dunghil; and old Linnen

nen muſt come cheap to the Paper-mill, and Linnen being in *England* a dearer Commodity than Woollen, and the Country colder, Linnen is not ſo much worn, as in warmer places; and ſo not ſo many Rags or refuſe Linnen to be gathered for the Paper-mills: To remove which there ſhould be encouragement given to ſome ſmall Agents in Towns, to gather up and buy all refuſe fine Linnen that can be had; As now in many places there is for corſe Linnen, and ends of Ropes, *&c.* for the making of Brown-paper.

And in caſe that deſign take of reducing *Flax* to a certain degree of Whiteneſs and fineneſs, by the before mentioned *Machine*; there will be much Tow or refuſe Flax, that may by the Paper-mill Hammers be reduced to the ſame conſiſtence, as hard ſeamy Rags of Linnen-Cloath uſually are.

The ſecond Objection is, That our Waters in *England* make not ſo white Paper as ſome foreign Waters do. For it is obſerv'd, that in *France* the whiteſt Paper is made but at ſome certain place, where the Water is more fit for it than elſewhere. In anſwer to which, There

are

are ſeveral Springs and Streams in this Kingdom that proceed from Chalk or rocky Mountains, that in the diſtilling leave a fine white reſidence in the bottom, that may be as fit for this purpoſe as any foreign Water whatſoever. Therefore Waters may be tryed in ſeveral places before the main work is begun. But this old Objection of want of good Water, is now become invalid: For ſince the French Mechanics have come over into *England*, they have proved the Water here to be equally as good as in *France*.

Of the making of Cordage.

If Lands may be rented, and proviſions for the Workmen may be had cheaper here than in other Countries; Then ſurely may *Hemp* be propagated, and Cordage made at eaſier rates, here than abroad; which being done, more might be exported, and leſs imported, to the great encouragement of *Agriculture* and *Mechanic* Arts. But an Objection here is alſo raiſed by the *Ropers*, *viz.* That our Hemp is harder than foreign, and doth not work ſo fine, nor take Pitch ſo well, *Quære*, whether much wa-

tering may not abate its Viſcoſity, and make it more pliable.

CHAP. V.

Of the Manuring, Dunging and Soiling of Lands.

Denſhiring of Land.

IT is now become a general Improvement of Champion or Green-ſward Land, to Denſhire or Burn-beat it; By which means very plentiful Crops of Corn are raiſed on poor and barren Lands. But the method now uſed by cutting or paring off the Turf with a Breaſt-Plow, is very laborious, tedious and coſtly, and ſometimes very hazardous; By reaſon that in a dripping Summer, this Work is much impeded, the Owner fruſtrated of his expectation of a great improvement; for that a great part of the Turf is not throughly burnt, and ſo becomes uſeleſs, and the Workman much damnified, being at a great trouble in often turning his Turfs before he

he can apply his Fire; and then at the charge of Furze, or the like Ollet, to burn the Turf withal; And the uſual expence in *Denſhiring* an Acre in a dry Summer, when at beſt, is twenty Shillings, or more; which in a bad year the advantage made by this Husbandry will not repay, although in a good year it will double it.

A Denſhiring Plough

To make *Denſhiring* therefore more eaſie and cheap: It is not difficult to make an Inſtrument to pare off the Turf as thin or thick as you pleaſe; That in ſtead of being forced forwards by more than ordinary humane ſtrength, it may be drawn by one or more Horſes, but not without the skil or labour of a good Workman to guide it: It muſt have two Wheels or Trundles; If they are low, then may your paring Plough reſt on the Axis; but if larger Wheels be found to be moſt proper, then may the paring Plough be fixed at ſome diſtance under the Axis; and either way it muſt have a long Stail or Handle, by which the Workman by elevating or depreſſing thereof, may cauſe the Turves to be pared thinner or thicker as he pleaſes, and as the

unevenneſs of the ground requires, ſo may he thereby regulate the Work. And thus with one Horſe and two Men, may two Acres at leaſt be pared in a day, in caſe the ground be even or ſmooth; but if uneven, or full of Stumps or Hills, then it requires reiterated operations; yet may two ſuch Men and one Horſe, pare an Acre in a day; and the Work every whit as well done, as by the tedious Breaſt-Plough.

Thus may an Acre be denſhired for a fourth part of the expence, and in leſs than a fourth part of the time, than by the other way. And although there may be but little dry Weather together, yet may you do a great deal whilſt it laſts.

There can be no exception made againſt ſuch an Inſtrument, nor difficulty ariſe in the uſe of it: But an ingenious and willing Artiſt, may by altering and amending it, as he finds the Error, anſwer it, and make it practicable: For there is nothing that is newly invented, but may and uſually doth meet with rubs, and ſometimes not a few in the way, before the Artiſt brings it to perfection; But this is an Inſtrument ſo feaſible and beng-

beneficial, that I cannot but encourage ſuch that have Lands capable of this way of Improvement, to ſpend ſome time and skill in perfecting it: The want of ſuch Lands of my own, preventing me from doing it.

You may alſo apply to this uſe, the new Plough hereafter deſcribed in the eleventh Chapter.

CHAP. VI.

Of the Benefit of Raising, Planting and Propagating of Woods.

Preserving of Woods, good Husbandry.

MUch hath been written by divers able Pens, in Commendation of Woods, as one of the principal general Improvements that can be made; Yet have some pretended that destruction of Woods in any place, would very much advantage the Trade of such places; by reason that the want of Timber, Wood, *&c.* for Mechanic Uses, and for Fewel, would necessarily introduce Imployment for many, in bringing all such materials, as must supply these defects that are occasioned by the destruction of Woods, which may be true; as well as, that the Burning of any *City*, *Town* or *House*, begetteth imployment for several Mechanics. But what is this to the benefit or advantage of the whole, which is ever to be weighed and considered of, in the promoting of any Improvement, Trade or Im-

Imployment? For in caſe the Timber and Wood, that now ſerveth any City or Town, with Materials for Building; and for all ſorts of Mechanics that *Work* in Wood; as Joyners, Turners, Wheelwrights, *&c.* and all poor and rich for Fewel, ſhould be ſo devaſted, that the Inhabitants of ſuch places, ſhould be conſtrained at an extraodinary expence to furniſh themſelves from abroad, with the like neceſſaries; although the Carriers of ſuch may in all probability gain very much thereby; yet every Tradeſman muſt pay the more for what he hath occaſion for; And by the ſame Rule muſt raiſe the prices of his Commodity, that is made of it; and in time muſt remove himſelf to ſuch places where he may exerciſe his Trade at a cheaper rate.

To deſcend to particular Examples of places: The Greatneſs of the Famous City of *London*, may partly be imputed to the plenty and cheapneſs of Timber and Fewel; without which in all probability it could never have encreaſed to that Magnitude. Nor had the Cities of *York*, *Briſtol*, and many others grown ſo great, but from the ſame cauſe. And many

many Towns ſtanding in the more Champion parts of the Kingdom, ſhew to every Traveller, that they are miſerable in reſpect of their Buildings, Trades, and Fewel. All which is ſum'd up in a few words, by the Pen of the moſt accompliſh'd Writer on this Subject, in his diſcourſe of Foreſt Trees: *Since it is certain and demonſtrable,* (ſaith he,) *That all Arts and Artiſans whatſoever, muſt fail and ceaſe, if there were no Timber and Wood in a Nation*; (*for he that ſhall take his Pen, and begin to ſet down what Art, Miſtery, or Trade, belonging any way to humane Life, could be maintain'd and exercis'd without Wood, will quickly find that I ſpeak no Paradox,*) *I ſay, when this ſhall be well conſidered, it will appear, that we had better be without* Gold, *than without Timber*, Chap. 31.

It is not the defect of any Commodity that makes a Trade, nor the dearneſs of Proviſion; but the natural ſituation of the Place, the induſtry of the Inhabitants, and the plenty of Materials and Proviſions: For it is the plenty of Proviſions, and other Materials, with the induſtry of the Inhabitants, and ſituation of the places, that contracted ſo great

great a Trade to *Barbadoes*, *Jamaica*, &c. and with that, great plenty of Mony; So that to ſay, *Its better to live where your Dinner muſt coſt a Dollar; than where you may Dine for a Groat*; is no argument that Proviſions are more ſcarce and dear, where your Dinner muſt coſt a *Dollar*, than where it may coſt but a *Groat*; but that there is more plenty of Mony: For in the moſt fertile Provinces or Places of *Europe*, is the greateſt plenty of Gold and Silver, which have been extracted out of the moſt ſterile Regions of the Earth. And by that plenty, are the rates and prizes of Commodities and Proviſions eſteem'd: As the rates and prizes in like manner have been in different Ages in this very Kingdom. For ſaith *Stow*, *Anno* 1288. A Quarter of Wheat was ſold in *London*, where it was deareſt, for 3 *s.* 4 *d.* in other places at 20 *d.* 16 *d.* 12 *d.* and in the Weſt and North at 8 *d.* the Quarter; when in our Age, ten times that price, is too cheap to maintain the Husbandman. The rates of Lands, prizes of Cattel, *&c.* were much after the ſame rate and proportion: Not that there is now a greater ſcarcity of every thing, or a greater number

ber of People. But the Subterranean Stores, have by the indefatigable Industry of Man been opened, and their Treasures dissipated. And such places that have been most fertile, and abounding with Woods, and other necessaries for Trade; well situated, and industriously cultivated, have by the interchanging of their Commodities, Provisions, and Manufactures, drawn to them the Wealth of the Indies, and other foreign Nations: And by their encreasing, and maintaining their Plantations of Timber, Woods, Corn, Fruits, and all other Tillage; and encreasing their Fleece-bearing Flocks, and other Cattel; do uphold and encourage the same Trade. But should they either neglect such political and excellent Husbandry; or instead thereof, destroy what Nature spontaneously produceth; instead of contracting Wealth from abroad, they may waste their Treasures in buying one of another, till they have nothing left to buy nor sell. Like unto the Ten Alehouse-keepers, (that when their Trade was low) agreed to meet at one of their Houses one day, and at another of their Houses the next; and so round to maintain

tain a Trade amongſt themſelves, which they did till they found their Drink all drank out, and neither of them a peny the richer.

Cutting of Woods at a due Seaſon good Huſbandry.

On the contrary; There are many Perſons in this Kingdom, that ſuffer their Woods to grow too long, which is neither profitable to themſelves, nor for the publick good. For when Timber or other Wood is at its full growth; it either ſtands at a ſtay, or ſenſibly decays, and ſome years before it hath done growing, it improves ſcarce one *per Cent'*. Such Perſons being poſſeſſed of an opinion, that it is ill Husbandry to cut down their Woods, (as too many have done) and conſidered not, that the Monies raiſed by ſuch Wood-falls would bring in a greater advantage to them, than the ſlow growth of ancient Woods can be expected to do, in caſe they are not yet at their full growth; and if they are, then they evidently loſe by their ſtanding. And the felling of ſuch well grown Woods, is alſo very advantagious to the publick: For it furniſheth the Markets with neceſſaries, which otherwiſe muſt be ſupplied from foreign

foreign Parts; for the leſs of the growths of foreign Countries we import, for our exported Goods or Monies, the more of our Monies we ſave, or elſe have the more of their Coin or Bullion. The due felling of Woods doth likewiſe produce an encreaſe of the ſame Species; witneſs the conſtant felling of Woods in *Berk-ſhire*, for the ſupply of many Mechanic Tradeſmen in *London*, with matter to work on; and a great part of the City with Fewel: And the like in *Suſſex*, for the ſupply of the Iron-works there. The gain ariſing from thence, encourageth the Owners of thoſe Woods to propagate and preſerve them; For in caſe any perſon hath (as I know ſome that have) an hundred Acres of Wood well grown, and ſhall every year fell five Acres of that Wood, until the whole be felled; always preſerving the ſame after felling; by that time the whole is felled, the firſt five Acres will be very well grown again; and the Owner in the mean time hath a conſtant Revenue out of ſuch Woods, and the Markets the better furniſhed. A notable Example of this Husbandry, hath the *moſt Worthy* Mr. *Evelin* in his Diſcourſe

Diſcourſe of Foreſt Trees, given of *the Lord* Scudamore, *his having in leſs than thirty years after the felling of a decayed Wood, neer a* 1000 l. *worth of Wood grown on the ſame Land, not of above the value of* 8 *l.* 10 *s.* per Annum. *Chap.* 34. So that the ill Husbandry is not in felling of Woods well grown, but in the not nouriſhing the growing Woods in the room of them. The ſame may be ſaid in felling of ſingle Trees in Hedgerowes. If ſuch Feller did but propagate three for every one he fells, as in *Biſcay* by the Law they are obliged to do. None need condemn ſuch for ill Husbands, nor ever dread a ſcarcity of this Material.

An eaſie way to eradicate great Trees.

In many parts of the World, the Woods are a great incumbrance, and hinder the tilling or improving their Lands. And in our foreign Plantations on the Weſtern Continent, one of the greateſt Expences they are at, is the cleanſing their Lands from thoſe cumberſome Woods that annoy them there; becauſe they have but few Hands, and the Labour is great to extirpate them. And as I am informed, there is a Perſon that hath diſcovered a more eaſie way, than hath

hath been formerly made uſe of, for the eradication of great Trees; And hath obtain'd his Majeſties Letters, Patent, for the ſole uſe of the ſaid newly diſcovered Art, in ſome foreign Plantation. And will (as is ſaid) undertake to cleanſe thoſe woody Grounds, at the rate of *6 d. per* Tree, which is very reaſonable in thoſe Countries. The manner of that operation I cannot learn: But this I offer as a very feaſible way to do the ſame thing; although perhaps it be not after the ſame method, which is only thus: Prepare two large Iron Hooks, with Loops to them; To each of theſe Hooks, faſten at the Loop a ſtrong, double or treble Block for a Pulley; affix one of theſe Hooks to the Tree you intend to eradicate: Then go to the next, or ſome other Tree at a convenient diſtance, and affix the other Hook therto; and with a Cord duly applyed to theſe Pullies, may one, two or three Perſons (as ſtrength is required) ſo forcibly draw theſe two Trees together, that a ſmall help at the Root of the Tree deſign'd for a fall, will ſoon extirpate it. The higher the Hooks are faſtned to the Trees, the eaſier will thoſe Trees

Trees bend to each other: If the Tree to be eradicated, be larger than that you make uſe of to aſſiſt the work; then place the Hook higher on that Tree, and the lower on the other. If the Trees be large you intend to fell, then let your Pullies be with three, four or more Rundles, and you need not queſtion but to maſter the greateſt Trees in the Woods, without any hard labour, or long time ſpent in doing it. And when they are down in ſuch places where their Wood is not valuable, their Aſhes may, for a good Fire will ſoon rid them out of the way.

F CHAP.

CHAP. VII & VIII.

Of Fruit Trees, and Garden Tillage.

HAving wrote a particular Treatise of each of these Subjects, viz. *Vinetum Britannicum*, and *Systema Horticulturæ*, since the publication of the first Part of this Work; what novel Experiments or Observations might be added to these two Chapters, shall be taken notice of in my second Part of these two Treatises, that entituled *Vinetum Britannicum* being hereunto subjoyn'd, to which you are referred.

CHAP.

CHAP. IX.

Of ſeveral ſorts of Beaſts, Fowls and Inſects, kept for the advantage and uſe of the Husbandman.

Of Horſes.

WIthout Horſes, the Husbandry of *England* would be of little Worth, the moſt laborious parts thereof, being by them perform'd; No other Beaſt being ſo fit as theſe for the Plough, Cart, Travender-Waggons, Packſaddle, or grinding in the Mill: Therefore every good Husband ought to be very careful of his Horſes, to keep them ſound, and in good Heart; for on them depends much of his Proſperity.

And the great uſe that hath been made of the more generous and luxuriant of theſe Beaſts, for the Saddle, Coach, Chariot, Raceing, and eſpecially for War (for all which Uſes no other Beaſt is comparable to the Horſe) hath

been very advantagious to the Husbandman, especially to such that have Lands proper, and take delight in propagating the best kinds; There being no greater profit to be made of pasturing Lands, than by breeding of good Horses.

of cows. As to the uses of *Milk*, *Butter* and *Cheese*, they are such, and so well known, that nothing can be more. I have only this to add, That as the various Soils, and the Herbage growing thereon, produce great variety of *Butter* and *Cheese*; although the Cowes and the Housewifry too be the same: Yet it is most evident, that tradition and opinion have so far swayed with most Country-People, that here is the best *Butter*, and worst *Cheese*; and there the best *Cheese*, and worst *Butter* to be made; that therefore they will not be perswaded in the least, to alter their vulgar Method of making the one or the other; although of late years, some ingenious Huswives have inverted that Course, and made as good *Cheese* (where formerly the worst only was made,) as hath been usually made in such places, that have been celebrated for good *Cheese*. The like hath been observ'd in making *Butter*: For

of

of the ſame Milk produced in any one ſort of Lands, are different ſorts of *Butter* or *Cheeſe* uſually made, meerly by the different method of the Houſewifry; as every one may obſerve, if they pleaſe. And although I pretend not to trouble the Reader, with the Art of making *Butter* and *Cheeſe*; nor to have any other inſight therein, than bare ſpeculation and hearſay; Yet I may from hence averre, that the Covetouſneſs in ſome, and Ignorance in others, is a great occaſion that bad *Butter* and *Cheeſe* are made of the ſame Milk; of which by good handling, very good may be had; for there is the ſame Philoſophy in theſe tranſmutations, as is in the fermentations of Beer and Bread: And all Men are ſenſible of the differences of the ſtrengths and taſts of thoſe things, meerly from the Mechanic operations.

To make the beſt Butter and Cheeſe.

For as I have heard, ſome out of a greedineſs to have a great quantity of *Butter*, take off too much Milk with their *Cream*, which makes a poor hungry *Butter*, and a barren *Cheeſe* of the remainder; others of a better reputation take only the top Cream, with which

they make their best Butter, and with the remaining Milk they make the better Cheese. All that is to be wish'd, is that the good Housewives understood more of this sort of Philosophy, and less wedded to Tradition and Humour; Then I am confident these Commodities would be very much improved. I will only here add a Receipt which I found in the *Annotations* on Mr. *Samuel Hartlib's Legacy* of *Husbandry*, how to make better Butter than ordinary, without setting the Milk for Cream, *viz.* *The Milk so soon as it is come from the Cow, must be strained, then Churn'd, as usually Cream is done. Also the Cheese made of the Butter-Milk, will be better than the best two-meal Cheeses that ever you did eat; And one pound of this Butter, shall be worth a pound and a half of your best Butter, which is made of Cream*; probatum *by a Gentlewoman, a great Housewife dwelling in the Isle of* Ely; which if it prove on trial what it promises, may be of great advantage. Its probable the great labour which will be required in so great an Agitation, hath deterr'd the always busie Housewife from prosecuting the Experiment; but the rolling or tumbling Churn,

Churn, I ſuppoſe may effect it with much leſs labour than the upright.

A new ſort of Milk Pans.

It is uſual for Houſewives to ſet their Milk to cream in broad earthen Pans, or wooden Treys, which take up much room, and are troubleſome in many reſpects; the deſign being to ſet their Milk as ſhallow as they can; it yielding the more Cream, or the ſooner, which is better. Therefore ſince the Art of making Lead into thin Lamins, Plates or Sheets, hath been diſcovered; I have ſeen broad and ſhallow Caſes of Board, made and lined in the inſide with this Lead, with a Tap-hole at the one Corner of each, and a Plug of Wood fitted to it. Theſe Caſes were about two Foot in breadth and length, and were placed the one by the other on a Bench; the Tap-hole hanging over, that the *Milk* after the *Cream* be ſcum'd off, may be let out thereat into a Pail, or elſe the Milk may be thereby drain'd greatly from the Cream; and then the Cream received by it ſelf, as the Houſewife pleaſes. Theſe Pans may be made greater or leſſer as the Dairy requires, and may be ſcalded as they ſtand with-

out removing them; the Hole a little declining to the Tap-hole. These Pans very much resemble the Brewers Coolers, wherein they cool their Worts: Thus may improvements be made even in the ordinary Arts of Housewifry, Cookery, &c.

Of fatning of Cattel.

It hath been found by long experience, that the sweetest Food, fatneth Cattel soonest. Therefore the Pastures that lie most open to the Sun, are more desirable by all sorts of Cattel, than the shady, the one being sweet, and the other sower. And *Clover*, *Trefoil*, &c. more than common Grass, from the same cause. And all sorts of Cattel become Fat sooner on these sweeter Pastures, than on the more sower. Oates, the sweetest of all Grain, are more desirable by the Horse, than any other, and fatneth him sooner. Barley made sweet by making, then ground and mixed with Milk, fatneth Fowl, especially Geese sooner than any unfermented Grain. Milk by reason of its innate sweetness, nourisheth and fatneth more than any simple thing whatsoever.

It

It is obſervable, that the leſs Milk any Beaſt gives, the ſweeter it is: Therefore *Aſſes* Milk is preferrable to *Cowes* Milk, and the Red Cowes Milk to the Black: *Mares*, *Ewes*, *Sowes*, &c. give leſs Milk than *Cowes*; yet their *Colts*, *Lambs*, *Pigs*, &c. grow faſter or fatter in proportion than *Calves*, and none of them will thrive ſo well with Cowes Milk, as with their own, by reaſon that Cowes give ſo great a quantity, and their Food only Graſs and Water; it cannot be ſuppoſed that their Milk ſhould be ſo Rich, as the Milk of thoſe that give leſs, or feed higher: Therefore ſome that have nurſed up young Pigs with Cowes Milk, have added Sugar to it; by which means, ſuch Pigs have grown much in a little time, and very fat withal, very much to the advantage of their Feeders; and their Fleſh hath been extraodinary white and delicate, much more than if they had fed on Cowes Milk alone; neither would they have thrived ſo well, in caſe they had ſuckt their own Dam: Seeing then, that the ſweeteſt Foods conduce moſt to the nouriſhment and fatning of Cattel, eſpecially *Swine*; in the fatning of which

is

is the greatest advantage to the Husbandman; such Foods are to be provided at the easiest Rates: Amongst which, *Turnips* are the best, which as they come raw from the Ground, may not answer the design: But in case they are boiled, and afterwards pressed, they yield a sweet and pleasant Juice or Liquor: *Turnips* (its known) may be raised in great quantities, at very easie Rates; and in a Furnace or large Kettle, many of them may be boiled together; these may be ground in the *Roll-Cider-Mill*, described in my *Vinetum Britannicum*, and there pressed (as Apples usually are for making of *Cider*:) In this expressed Juice, may you add ground *Malt*, *Barley*, *Oates*, or the like; the sweetness of this Liquor, with those nourishing Grains in it, may without doubt fatten any Cattel, especially Swine, sooner and cheaper than their feeding on hard Corn can do, especially in such Years that Grain proves dear. If you boil your Turnips often in the same Liquor, that Liquor also will become sweet.

For it is the liquid parts of any Roots that nourish; the Murc or refuse when the Juice is pressed out, addeth little to the

the nourishment of any Creature. And this expressed Juice here becomes a Vehicle for the Meal that you mix with it, to digest and distribute it, according to the Law of Nature.

It may be objected, that Fat so suddenly raised, is not so firm as that which is caused from the Cattel, their feeding on harder Meat, which may be true: Yet if I can by this means raise my *Cattel* or *Swine* to a good degree of Fatness, I can for some reasonable time after feed them with hard Meat, till their Fat is better digested, and made more firm.

CHAP. X.

Of common and known external Injuries, Enemies, and Diseases, incident to, and usually afflicting the Husbandman; and their Preventions and Remedies.

GReat Drought attended with Heat in the Spring, usually determines about the Summer *Solstice*, or soon after: For the advance of the Sun to the *Tropic* of *Cancer*, in a very hot Summer inclines the *Air* to Showers, something like the alteration of the Season, annually begotten by the access of the *Sun* on the Northern Coast of *Africa*; where the *Rains* so follow the *Sun*, that very soon after it hath passed the most Northern Degree of the Equinoctial-Line, the *Egyptian Nile* gives a Testimony of the same: So in this our oblique part of the *Sphere*;

if the Spring be Hot and Dry, the Summer uſually proves Wet, as it did in 1681. when we had the drieſt Spring that had happened within Memory; and ſoon after the *Suns* entrance into *Cancer*, great Rains followed.

Prevention of ſcarcity of Fodder by Drought.

In the like caſe, which ſometimes doth happen, where the Husbandman foreſees a defect of Paſture or Fodder for the ſucceeding Winter, by reaſon of the Heat and Drought of the Spring, or early part of Summer; He may ſow a proportionable part of his Farm with *Turnips*, which may be ſown in the greateſt Drought, and in the next Rain they will grow; and a ſhowry *Autumn* (of which he need not deſpair) will make his Turnips ſo flouriſh, that an Acre of them in the ſucceeding Winter, will ſtand him in more ſtead than ſeveral Acres of his Meadow Lands.

To prevent Turnip-ſeeds from being deſtroyed by Birds and other Vermin.

The Seeds of Turnips are very much deſired by ſmall Brids, which not only prey upon them when ripe on the Stalk, but when ſown on the Ground, and eſpecially when they firſt begin to aſpire, they draw the ſwoln Seeds out of the

Ground by the tender Shoots, and ſo deſtroy many, yet leave behind them enough to ſtock your Field. But that which proves the greateſt deſtruction to your Turnip-ſeed, are the multitudes of Flies that uſually at that Seaſon of the Year by the Suns influence are generated among the Stubble, that remained in the Fields where you now ſow your Seeds: For it is obſerv'd, that an eaſie ploughing and ſudden ſowing of theſe Seeds, makes them more apt to be thus deſtroyed, than a well dreſſing, and more leaſurely ſowing, for this deprives thoſe Vermin of their ſhelter and ſuſtenance, that they generally die before the Seeds are come up: However to prevent the worſt, take Soot, eſpecially out of Chimnies where Wood is burnt, and ſteep it in Water; and when the Water is well tinged with the Soot, throughly moiſten your Seeds therewith; then ſpread them abroad on a Table or Floor, and when they are a little dry again, then ſow them, and the bitterneſs they have attracted from the Soot, is ſaid to be a ſecurity againſt Birds, Flies and Inſects.

Choice

Choice Seed well limed and ſown on good Land, that was not ſown with the ſame Grain the precedent Year, rarely produces ſmutty Corn: For ſmuttineſs is a degeneration of the Wheat; cauſed either by ſowing the ſame Land often with the ſame Species, or elſe with Seed that hath been taken from the adjacent Land, of the ſame nature with that on which it is ſown; or elſe by ſowing it on very poor Land, where the bulk of the Straw and Corn is raiſed, either by the force of Dung, or a drippy Summer, rather than from the natural ſtrength of the Land. Therefore if your Land be fit for Wheat once in 2 or 3 years, buy your Seed from another Soil, and ſee that your change be proper, which the experience of your Neighbours can beſt inform you: For although you fetch it a great way, yet the large product will eaſily defray that expence: And let not your Land be ſown often with the ſame Grain. Then before you lime your Wheat, put it into a large Veſſel, fill it with Wheat about half full; then add ſo much Water as will quite

To prevent ſmut in Wheat.

fill the Veſſel; then ſtir it well, and ſcum off all the light Corn, and ſo keep it ſtirring to the bottom of the Veſſel, till no more of the Wheat will ſwim, and them lime it: Thus do to all your Wheat that you ſow, and you will not have a ſmut-producing Seed left; for the light imperfect Corn, it is that produces the ſmut.

To mow or reek Wheat to prevent Mice.

Great care is uſed in many places to build *Reek-ſtavals*, on which they Reek their Wheat to prevent the Mice, which otherwiſe would devour it: By which Vermin, Mows of Wheat in Barns are very ſubject to be devour'd: Therefore to prevent Mice from feeding on Wheat-Mows in Barns, after you have lain your Courſe of Straw to bed the Flower withal, ſtrew ſand round on the edges of the Bedding; then lay a Courſe of Sheaves, and on the ends of the Sheaves, at the outſide of the Mow, ſtrew more ſand, and ſo on every Courſe of Sheaves round the Mow to the very upmoſt Courſe; by which means it will be preſerved from the Mice: For when they endeavour to make their way into the Mow, the ſand (which will ſoon be very

very dry) will fall into their Ears, and ſo torment them, that they will never attempt to come there again: This hath been many years uſed by an able Huſbandman, with the deſired ſucceſs, and without the leaſt inconvenience or damage to his Wheat, for the ſand will never mix with it.

To deſtroy Snakes, Adders, &c.

Snakes, Adders, Blind-Worms, &c. many times are hurtful to Men and Beaſts: To deſtroy which in ſuch places where they uſually haunt; lay a Bed of new *Horſe-Dung* about *April* or *May*, and in *July* and *Auguſt* following, caſt your Dung in a Morning to one ſide, till it be all removed, and you will find their Eggs, and it may be many of the old ones which you may deſtroy; this may be done twice or thrice in a Summer. Thus have I for ſeveral years, deſtroy'd many in my ſmall Vill; for the warm Dung, attracts them from the ſeveral parts of your Ground to lay their Eggs therein, as ſtinking Fleſh doth the Fly, whereas in a Trap you may take them; if your Ground be large, you may place ſeveral of theſe Dung-heaps.

To prevent and cure the Rot in Sheep.

Sheep being Beaſts that delight in dry Meats, and thrive beſt on the dryeſt Lands, Mountains or Hills, and can live throughout the Year without Drink, (except in great Droughts) are ſubject to the *Rot* in very wet Years, or in moiſt Paſtures: This Diſeaſe being cauſed by cold and moiſt Food, filling their Bodies with a ſuperfluous moiſture, and decaying their Livers, ſoon deſtroys them. The uſual preventions therefore of this Diſeaſe, have been to feed them on the drieſt Lands, to keep them late in the Fold in the Forenoons; feed them with Hay, and mixing Salt with it, *&c.* But where theſe are not with conveniency to be made uſe of; it may be conſidered whether ſome ſorts of Vegetables may not be propagated as proper Remedies, as well to cure, as prevent this Diſeaſe, as ſome have been to cauſe it. Amongſt which preventing or curing Vegetables, none ſeems more efficacious than *Parſley*, a Plant eaſily propagated, and hath all the qualifications of ſuch a Medicine or Remedy; Of its Propagation and Virtue

tue, ſee more in the third Chap. of this ſecond Part.

CHAP. XI.

Of Inſtruments, Tools and Engines, incident to this Profeſſion of Agriculture.

THe moſt principal Inſtrument uſed in Husbandry is the *Plough*, and as it is, ſo have ingenious Men contrived ſo many ways to make them more uſeful, and leſs toilſome; that there is more variety of *Ploughs* in this Kingdom, than of any other *Machine* whatſoever. But that which I am now to add to my former Treatiſe of this ſubject, is, That there are divers new ſorts of Ploughs invented, and endeavoured to be brought into uſe, ſince my publiſhing the former Tract: As the *Steel-Plough*, a Model whereof was (not long ſince) curiouſly made by one Mr. *Thomas Llewellin* *Of the Steel-Plough.*

Llewellin, at the *George* in *Cateaton-street* in *London*; wherewith he pretended, that with one Man and two Horses, or one Man and two Oxen only, might be plowed any sort of Land whatsoever, as would not be performed by the common Ploughs, with less than double the Men and Cattel, which he offered as an infallible and unmatchable improvement. I have seen the Model, and it was well made; and without question such a Plough will far exceed the usual Ploughs, by reason that a well made, true and clean Instrument of any kind or sort whatsoever, will perform its Work for which it is intended, better than an ill shapen, false and rough can do. A Coach, Charriot, or Waggon, made high and true, will be drawn much easier than one that's gross, and ill made. The Cutting parts of the Plough, also being made of well temper'd Steel, and keen, abate a great part of the strength required in the Draught, as a sharp Ax or Saw, will more easily break a Tree, than one that's dull. I know it will be objected that Steel is much dearer than Iron: To which I answer, That in case a Plough cost 20 or 40 *l.* extraordinary in the

Steel

Steel and Workmanſhip, it will ſoon be repayed, if 1 or 2 *s. per diem* can be ſaved (as no doubt but it will) in the uſe of it; beſides the advantage of time, which is of more worth at ſome ſeaſons, than all the extraordinary expence amounts to. As for the other more principal advantages of this Plough, with the deſcription of the Plough it ſelf, I refer you to the Author Mr. *Llewellin.*

Of the French Ploughs.

There is another ſort of Plough brought into uſe by ſome French Men, (as I take it) which is very much like the double Plough deſcribed by Mr. *Blith* in his 33*th* Chapter of his *Englands* Improvement, which will carry two Furrows at once: As for the deſcription, uſe, and advantages of this double Plough, I refer you to the *Monthly Collections of Letters, of Husbandry and Trade*, Collected and Publiſhed by that publique, ſpirited and ingenious Mr. *John Houghton, Fellow of the Roial Society*, where it is at large deſcribed, with its uſes and advantages.

The deſcription of a Trenching Plough.

In light Grounds it is uſual for ſix or more labouring Men to follow the Plough

Plough at ſome diſtance; each taking ſome proportion with their Spades to caſt up the Earth from the bottom of the Furrow, on that which was turned over by the Plough; ſo that an Acre of Ground may thus be Plough-trenched in a day, as well as if the ſame had had been wholly done by hand; the Plough going before, and turning in the Sward or Turf; and the Spades coming after and covering it with light Earth, makes it capable or fit for various ſorts of Tillage to be planted in it: This way ſaves a great part of the charge of Trenching altogether by the Spade.

But an eaſier and cheaper way may yet be found to Plough-trench Land, without any help of the Spade; which is by making a Plough that ſhall undercut the Earth, and caſt it over, inſtead of the uſual way of plowing: For in the uſual way, the Plough is made pointing, and is forced under the Sward, and by the ſpreading of the Plough, and help of the turning Board, the Earth is forced fromwards, which requireth much greater ſtrength, than if the Plough were made of a proportionable breadth from the the point of the Share, to its hinder part,

part, and the Earth or Sward carryed from the bottom, and a turning Board caſt fromward; and then you may add either a ſecond Coulter and Share, to ſucceed the former (fixt to the ſame Beam) about four or five Inches lower, which ſecond Coulter and Share will cut and take up another courſe in the bottom of the Trench, and carry it higher, and then the turning Board will throw it on the firſt Plowing; or elſe another Plough may be made to caſt higher than the firſt to follow it: Each of theſe Ploughs may be drawn with half the ſtrength of the common forcing Plough, becauſe it cuts, raiſes, and caſts over the Earth without any ſide-forcing.

This Plough may be made five, ſix or ſeven Inches broad or more, according to the nature of the ground, and ſtrength you intend to uſe, whether one, two or three Horſes to draw it; and will not only ſerve to plough, and Plough-trench Land; but alſo to pare off the Turf of ancient Paſture Land, in order to the burning of it; for the Foot on which the fore-end of the Beam reſts, may be made to ſtand higher or lower as you pleaſe; that it may cut thinner

or

or thicker, and being as broad, will do that work as well as the breast Plough, and with five-fold more expedition.

The Ingenious may soon make perfect this design, and bring it into use: I have made a Model which answers what I have proposed; and had I an assistant, should soon bring it to perfection: However these hints are sufficient to them, that truly understand the use of the Plough.

FINIS.

THE

Second Part

OF

Vinetum Britannicum;

OR, A

TREATISE

OF

CIDER.

By *J. W.* Gent.

LONDON,
Printed in the Year 1689.

UMI

THE PREFACE TO THE Second Part OF Vinetum Britannicum.

HAving formerly given you an account of most of the principal Things relating to the making of Cider, *and other of our* British Drinks *in a*

plain and ſhort Method, that it might ſuit with the Capacities of thoſe that are uſually imployed in thoſe Rural Exerciſes: There now remains ſome few Obſervations *and* Experiments, *which may ſerve as a ſupplement to that Treatiſe for a farther improvement of theſe Curious Liquors,* (*eſpecially* Cider) *and may probably be a help to thoſe that imploy themſelves ſometimes in endeavouring their Meliora-tion.*

Many have attempted to improve them, but for want of a right apprehenſion of their Natures, have been fruſtrated of their Expectations: And when they have been miſtaken in the cauſe of the Defects in making theſe Liquors, *inſtead of rectifying, have made them worſe; That when they have ſome-*

times

times made a Veſſel of Good Cider, it may be rather imputed to chance than skil. So that the moſt Ingenious made many years Obſervations before they could rightly apprehend the natural and moſt regular Method of making it: For ſince the publiſhing of the former Part of the Treatiſe of this Subject, the experience of ſeveral Years, hath not only given me cauſe to correct ſeveral Miſtakes in my former; but capacitated me to preſcribe in the Second Part a New Method of making the beſt Cider that Apples are capable to yield; beſides many other very neceſſary Obſervations and Experiments relating to the ſeveral Matters before treated of.

In this Second Part I hope to remove ſuch Remora's that have

been laid in the way, by great Pretenders, whose authority in matters of this Nature, have wrought so far on very many Ingenious (though credulous) Operators on this Subject; that after many trials they failing of their desired success, it hath caused them to despair of obtaining that certain way of making Good Cider, *so seemingly plainly by them set forth; whose Aphorisms and Rules (had they proved always true) had doubtless raised this Liquor into a great deal higher Reputation, than now it is amongst the numerous Planters, which have been, and are very much increased by the confidence they have put in what they have read and heard, and the Encouragements they have received from those that have sometimes hit the*

Mark:

Mark: Wherefore to undeceive and gratifie the Curious, and ſuch that are willing to promote ſo good a Work, as the Improvement of ſo great a part of our Engliſh Huſbandry, and to better inform thoſe that ſpend ſo much time, pains and expence in fruitleſs Experiments, and in compounding and corrupting, inſtead of meliorating ill made Cider; *I ſhall herein diſcover the true Nature of this Liquor, and the right Method of making it cheap and eaſie to the Operator*, delightful *to the* Eye, pleaſant *to the* Palate, grateful *to the* Stomack, healthful *to the* Body, *and* durable *to the advantage of the* Good Houſe-keeper, *who may have of it in its purity and primitive Sweetneſs, not only throughout the Year, but for many Years after it is made.*

The right understanding of which Method, *may be an encouragement to the* Gentry *and* Yeomanry *of the Northern Parts of this Kingdom, who now value the* Cider *of* Hereford-Shire *to them carried at a coſtly Rate, above* French Wines; *That they may of their own Fruit make* Cider *equal to the beſt of* Hereford-Shire. *They may now try this* Preſcript *with their leſſer quantities, which proving right, will beget an emulation amongſt the* Good Huſbands, *who ſhall have the faireſt Plantations, and amongſt the* Good Houſewives, *who ſhall have the beſt* Cider. *I need ſay no more here, but refer you to what I ſhall write in the following Tract, where I ſhall freely impart what I have obſerved, and not (as is too uſual-*

ly done) conceal that which moſt conduces to compleat the intended deſign, leſt another ſhould partake of the ſame advantage. If the Operator *finds not at firſt what he expects, He muſt impute his Error to his own Miſtakes, and not condemn ſo* regular a Method, *nor Cenſure the* Author,

J. W.

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CHAP.

CHAP. I.

Of Drinks in General.

IN the first Part of this Treatise, I have given an account of such Subjects or Materials, out of which Drinks or Liquors are extracted or prepared: As of the Sap of several sorts of Trees therein mentioned; and particularly of the Birch Tree, the Sap whereof hath been in great esteem, not only for its Pleasantness, but its singular medicinal Vertues. It hath been also observed, that the Sap of the *Sicamor*, is a very clear and sweet Liquor; And that several other Trees yield plenty of *Sap*, which far exceeds common Water, either for the making of *Mead* or *Ale*. The *Vine*, if planted for no other use, would certainly by cutting the Branches in the Spring, yield a great quantity of delicate

Sap of Trees.

delicate Liquor. The Saps of the *Elder*, *Elm*, *Oak*, &c. are well esteem'd for their Medicinal Vertues. The Walnut Tree, and the Bramble, yield plenty of Liquor by cutting, which doubtless are not without their Specific Virtues.

Juices of Fruits and Berrits.

Of late it hath been proved that *Quinces* yield a delicate Wine, surpassing most Drinks: *Peaches* also and *Apricocks*, by some are made to yield pleasant Wines. Of the Whortle-Berries that grow on the smallest of Shrubs, is made a very fine and pleasant Drink.

Of Roots.

Some have pressed a Juice out of contused *Carrots*, and found the same to be a pleasant, sweet Liquor; but this hath need of some farther enquiry into, and experiment to be made of it.

CHAP.

CHAP. II.

That the Juices of Fruits, are the best of Drinks, and Universally Celebrated.

SOme, and but a small part of the known World, please themselves with the excellency of Drinks, made by the Tincture of fermented Grain: But the most part, and those we conclude to be the wisest and most ingenious, extract the long digested, and pure Liquor, from Fruits proper and natural to the Countries they Live in; esteeming it to conduce more to Health, Pleasure and long Life, than other Drinks. A learned Author of late in his praise of Wine, attributeth these virtues or qualities to it, *viz.* That it nourisheth more than any other Aliment; That it corroborateth human Strength; That it openeth Obstructions, and comforts and exhilerateth the Spirits: That the use of it in all tempers, is most *Natural Aliment*; *The excellency of wine.*

ment; and in all Distempers, as proper *Medicament*. The nature and excellency of this *Nectar*, was so high in the Opinion of *Noah*, that he made it his first Art of Husbandry after the Deluge, to plant a *Vineyard*; The vertue and moderate use of the *Juice* whereof, may be supposed to be the cause why his Age extended twenty years above the Age of *Adam*; and three hundred and fifty years after the Plantation of his Vineyard. Drinks extracted out of Grain, and other compounded Drinks being then not in use; nor hath the use of them, since their Invention rendred their Drinks so Healthy and Long lived, as the *Spirituous Juices* of several *Fruits*, especially of the *Vine* and the *Apple-Tree*.

But because these Wines that are endowed with these Vertues, must be imported from the places of their native growth; and do suffer so sensible a deprivation of their excellency in all respects, that they may be compared to the *Drugs*, transported from *Cochin-China* to *Italy* by *Barri* the *Jesuit*, which as he relateth were so altered in their Transportation, that without a special

Script

ſcript upon them, he could not have known them to be the ſame, either in Vertue or Colour: And certainly theſe Liquors muſt much more ſuffer, than thoſe more ſolid Materials; The frequent Fermentations, Boilings, Frettings, &c. of theſe, in their being moved and tumbled from place to place, and through divers Climates ſubjected to the variety of *Airs*, cauſing an expence of their more ſpiritual and better parts; and a precipitation of their more ſolid and delicious, which are the moſt nutritive; ſo that in effect we have but the Phlegmatic Part deprived of its principal Vertues; And that part too, oftentimes corrupted with the *Coopers* or *Vintners* Art, to make it pallatable and durable, that it becomes ungrateful to Nature, and injurious to Health and long Life, which evidently confirms our next Poſition.

CHAP.

CHAP. III.

That Cider *and other Juices of our English Fruits, are the best Drinks for this Country.*

The Antiquity of Cider.

THat *Cider* hath been of ancient Use in this Kingdom, and that the name of Wine was attributed to it, I have lately met with a farther Confirmation in a small Tract, entituled *Fragmenta Antiquitatis*, being *Ancient Tenures* of *Land*, published by *T. B.* of the *Inner-Temple* Esquire, *Anno* 1679. Wherein there is an account of the Manor of *Runham*, in the County of *Norfolk*; that the Tenant held the same of the King in *Capite*, by the Service of two *Mues* of *Wine* made of *Permains*, to be paid into the *Exchequer*, yearly at *Michaelmas*. This Service was reserved in King *Edward* the firsts time, about four hundred years past; whence may be noted, That the *Permain* is an ancient English Apple, and that it always

ways was esteemed one of the best of Apples, and yielded one of the most delicious of *Ciders*. And its probable that as foreign Wines became here more in use, that Husbandry of propagating Permains decayed, the Trees being slow of Growth, and small Bearers, which might probably be the cause why this Wine was reserved to the Kings use, more than that of any other Fruit; it being more rare and delicious.

The excellency of Cider.

Cider made of *Mature Fruit*, regularly extracted, and naturally prepared; obtaineth its corroborating and exhilerating *Spirits*, and its nutrimental Sweetness, that its Vertues far exceed those of the transported Wines; and may almost compare with many of those Wines in their proper Countries. Of this matter we have said enough in the first Part of the Treatise of this Subject; and shall therefore hasten to the true and regular way of preparing this most *inestimable Drink* from the *Soil* to the *Fruit*, and thence to the *Liquor* in the *Glass*, fit for the most *Curious Palate*; together with the several other *Drinks*, that are most desirable by the ingenious Enquirers into these things.

CHAP. IV.

Of the best and most expeditious ways of propagating the several sorts of Fruit-Trees.

Change of Plants an Improvement.

AS Fruit-Trees, some of them do effect one sort of Land, and some another; and that Judgment is required for the placing of these Trees in their proper Soils wherein they must delight: So do some Species of Trees grow weary of the Soil wherein they have been long planted, and do also some time degenerate, as several sorts of Grain do, when often sown in, or near the same place; and some Plants do the same, if planted often on the same or the like Ground: The usual remedy in such cases, hath been to change the Seed, fetching it a far off; and by procuring other Plants from another Soil; as in *Wheat, Strawberries, &c.* is generally observed. After the same

ſame manner, in caſe it be obſerv'd that Trees that have been planted and propagated in a Soil wherein they have delighted, do by frequent graffing and ſetting of the ſame Species in the ſame ſoil, degenerate. Your ſureſt remedy then will be to procure Graffs or Plants of the ſame Fruits from another Soil; as formerly the Graffs of the *Kentiſh Pepin* were brought out of *Normandy*, and it proving to be a good change of Soil, they proſpered exceedingly for many years; yet now it is obſerv'd that the Trees are more ſubject to the Canker, and proſper not ſo well, nor is the Fruit ſo good as formerly it hath been; Therefore have ſome ingenious Men, either already obtain'd, or ſhortly intend to procure freſh *Graffs* from *Normandy* to renew that Kind, not queſtioning the ſucceſs to anſwer their expectations.

Brackiſh Land good for Fruit.

It is obſerv'd that *Horſes*, *Sheep*, *&c.* thrive beſt on Marſhes that lye near the Sea, uſually called the Salt Marſhes, by reaſon of their Brackiſhneſs. *Bees*, *Pigeons*, *&c.* thrive beſt alſo where they can come at the Salt and Freſh-water;

Fish are very much improved in a Brackish Water: So are many Vegetables likewise; and in particular, *Apples* growing on brackish Grounds near the Sea, yield a more rich and vinous *Cider*, than those that grow more remote; and those the poorest of all *Ciders* that grow on sandy Lands, which attract most of their juicy Substance from the Rains, although they are all of one Species. The Trees on such barren Lands, yielding plenty of Fruit in wet Summers, and few in dry, for want of that Nourishment which rich Lands furnish the Trees withal: Therefore those that have Lands lying well near the Sea, may promise themselves better *Cider*, than those more remote.

Newly recovered Lands not good for Fruit. Their remedy.

Nevertheless Land newly recovered from the Sea, whilst the Salt remains too much in it, is not good for Apples: But if it be cast in small Hills that the Rains may wash the Salt from it, and this labour often reitrated until the Soil be moderately sweetned, and the Trees planted shallow in it; questionless they will then thrive, and if you can bring them to grow, you need not doubt the excellency

lency of their Fruit and Liquor; And a better help to ſuch Lands cannot be than a mixture of ſweet Earth, fetched from above the taint of the Salt-Water, with your Salt Land: Nor can you better improve the poor ſandy Orchards, than by laying near the Roots of your Trees, Salt Clays or Earths, or other ſaline Matters in caſe the Sea be near.

Sweet Apples raiſed of cions.

Beſides the *Codlin* and *Gennet-Moil*; there are ſeveral *Sweet-Apples* that may be propagated by *Cions*, *Slips* or *Cuttings*, whoſe uſe in mixing with other Fruit in making *Cider*, ſhall hereafter in this Second Part be treated of. The raiſing whereof is the more to be encouraged, by reaſon the way is eaſie, and the Fruit coming to maturity about the time of the *Redſtreak*, becomes very uſeful in mixing with them as hereafter is ſhewn: There is an other curious *Cider-Fruit*, that may be eaſily raiſed by the ſame Method as *Codlins*, which by meer accident I have diſcovered; but I cannot give you the Name of it, unleſs it be that which is uſually called the Spice Apple, being to me a new Species, and came among my *Codlin-Slips* by accident.

The Quince a Vinous Fruit.

Such hath been the ſcrutinous Nature of Man, that he hath ſcarce left any Fruit unattempted, to extract its Blood for his uſe or delight: For the *Quince*, an auſtere Fruit, and of ill ſavour, hath been found by expreſſion to have yielded a very excellent Wine. Therefore in moiſt and rich Lands, the propagating of Quince-Trees ought to be encouraged: Its ſaid, that in that part of the *Weſtern Continent* now called *Carolina*, there grow ſuch vaſt quantities of this Fruit, that they make very much of its Wine.

Whortleberries yield Wine.

In the Heathy Parts of *Surrey*, *Hamp-Shire*, *Suſſex*, *&c.* grow great quantities of Whortleberries, uſually called Whorts or Bilberries, of which is made a Wine inferiour to none of all the Artificial Drinks, that are extracted out of Fruits, being delicately taſted, and of an excellent Colour.

Planting Trees on ſhallow Land.

If your Ground be ſhallow, either Sandy, Chalky, or Stony, Plant your Trees near the Surface, and lay ſtore of Mold or Earth about them, for about

about five or ſix Foot round the Tree, that they may ſeem to be planted Deep; that they may well be defended from Drought, and the Roots will naturally incline downwards, and the Trees thrive as if planted on a deeper Soil.

The moſt probable way to raiſe a Vinyard.

Many have attempted to raiſe Vines after the manner of the French in Vinyards, and have had good ſucceſs in raiſing them; but the Fruits (however the Vinyard hath been poſited or ſituate) have not anſwered the Planters expectation, not being ſo mature as thoſe that are planted againſt Houſes, Walls, or the like; by reaſon that the Air moving too and fro, inceſſantly refrigerates the Vine in the Spring, preventing its early Budding in the Summer, the early Blowing of the Grape; And in the Autumn, the ripening of the Cluſters; ſo that let the Vineyard be planted againſt any South declining place; yet the cool Air moves through the open interſpaces of the Vines, and Leaves, that rarely our Summers are hot enough to qualifie it without ſomewhat of Art to be uſed. Therefore if thin,

low Walls of Brick, or the like, of about three or four Foot high, were built the length of the Vinyard from East to West at a convenient distance, that they may not shade each other; and the Vines planted against them, at the same distance and height as in Vinyards; it would not only break the cool Breezes, but add to the heat of the Sun; especially if the Ground before them be kept bare: But left this way may be too chargeable where Bricks are dear, it may be much cheaper to drive in a strong Stake, or two slender Stakes at the back of each Vine, of about four Foot high above the Ground, to which about the time the Vine begins to spring, you may add a thin Board of about twelve Inches broad, or two Boards fixed together, making about eighteen Inches broad; against which you may tack your Vines and prune them, as in the first part of this Treatise is directed, only you need not turn them Archwise. These Boards will break the Winds, and keep the Grapes warm after the Sun hath left them: Then after your Vintage is over, you may lay the Boards on heaps to

keep

keep them from Rotting till the Spring: The Stakes may ſtand for many years if they are of Oaken Spine: The charge and trouble will not be great, if you conſider that your arched Props ſoon decay, and the conſtant annual Charge and Trouble the Planters of Hops are at, in renewing their Poles, and preſerving them in the Winter; much greater than this can be in continuing theſe Boards, which lie in a little room, and endure many years ere they decay.

If your Ground be ſo fertile, that your Vines grow too rank, and Weeds encreaſe too faſt; then may you lay Sand near, and before your Vines, thick enough to ſuppreſs the Weeds, which will very much add to the heat of the Summers Sun, and thereby accelerate the maturation of your Grapes; and alſo abate the too great fertility which much of our Engliſh Soil is ſubject to; for the meaneſt dry and warm Land (ſo that it be not barren) is fitteſt for a Vinyard: *Bacchus amat colles.*

The moſt certain Cure of the Canker in Trees.

Many of our beſt Fruit-bearing Trees, are ſubject to that pernicious Diſeaſe the

the *Canker*, which in many places deſtroys the whole Tree; And notwithſtanding all the Cuttings, Parings and Plaiſtrings that can be uſed, yet every new Shoot will be tainted with this Diſeaſe, as it hath happened to me in many of my beſt Fruits; and more particularly in one Tree that I moſt valued, which the Canker had yearly ſo defaced, that for eleven Years together I had cut and pared its Wounds, that it was little the bigger in its growth, and had in all that time born only four Apples. In *February* 1682, I was willing to try ſome new experiment towards the Cure of that Diſeaſe; and having conſidered that the Land it grew on, was rich and light; and that in many places I had obſerved Trees to flouriſh in Courts and Yards, where the Soil was of the ſame Nature, and the Ground pitch'd or pav'd with Stone; I therefore cauſed the Earth to be taken away round my little, but diſeaſy Tree, about four Foot from the Stem, and about five or ſix Inches deep, and in the room thereof cauſed Stones to be ſet very cloſe and near together in Dirt taken out of the High-ways inſtead

ſtead of Sand, after the ſame manner as Yards or Streets are paved.

The Tree thus paved round, in the Summer following emitted many fair Shoots; and in Autumn 1683, yielded above fourſcore fair well grown Apples, and increaſed in clean Branches, more than it had done in ſeven Years before, without the leaſt touch of its old Diſeaſe, and moſt of the old Sores were alſo skinned over, having firſt a little cleanſed them. In the Year 1684, this Tree continued in its flouriſhing and healthy Condition, encreaſing as before in its Branches; that to check its too great aſpiring and ſpreading, I was neceſſarily forced to cut off the Tops of many of the new Shoots: Its Branches were alſo ſo laden with Fruit, that to preſerve them and the Tree, I cauſed Props to be ſet to ſupport ſeveral of them; which ſtrange effects were ſo evident, and conſpicuous to many, that knew the former ſtate, and after ſaw the amended condition of the Tree; that they were ſufficiently convinced, that the laying of thoſe Stones were the very cauſe of the cure; and I am the more ſatisfied in my Opinion that it

it was ſo: For that in the Year 1684, in the ſame manner I abated Earth from ſeveral other Trees infected with the like Diſeaſe, and applied (for cheapneſs ſake) a proportionable quantity of Chalk, and ram'd it faſt about the Trees, which hath produced near the like effect, as was from the paving with Stone; but I as yet queſtion whether it will have that duration as Stone, ſo as to continue ſolid, it being apt to diſſolve, and degenerate into Earth.

For it is the depreſſion or detention of the *Spiritus Mundi*, or the true fertilizing Spirit in the Earth, about the Roots of the Tree, that thoſe Roots may the more plentifully attract it; and the prevention of other Vegetables from extracting and waſting it, that is one principal cauſe of the proſperity, and fertility of the Tree ſo paved about: For the more of this true nitrous and vegetating Spirit there is, and the leſs of the Crude and common Water, the more fertile and healthy will the Tree be. This Experiment I hope will be of general uſe and queſtion; not but it will ſucceed in moſt places where this Diſeaſe is common.

Never-

Nevertheleſs, after all this care, there will remain ſome Fragments of the old Diſeaſe, it being ſo confirmed in the ſtock, that it will never be clean out of the Branch; like unto the *Lues Venerea* in ſome Animals: For if a Tree be infected with this Diſeaſe the Canker, although you graff a ſound Graff of another Fruit on the ſtock, and leave but a few Inches of the Cankery Tree above the old ſtock, that ſmall part ſhall infect the new Graff, and all its Shoots: But however this Method of mine hath had much greater effects in the Cure of that Diſeaſe, and is more certain than any other yet publickly known: And the ſame Tree I ſo cured, continues in a very flouriſhing condition to this preſent Year 1688.

CHAP.

CHAP. V.

Of making Cider *and other Liquors of Apples and other Fruits.*

NOtwithstanding many have been so fortunate as to have a full Plantation of Fruit-Trees, and those also very fruitful; yet have they not had *Good Cider*, (unless sometimes by accident) either for that they have gathered their Fruit before it hath attained its due maturity, for the Juices of Fruits are best improved in their own proper Vessels, (their skins) as Grapes the *Vignerous* of all foreign *Vingards*, let them hang on the Trees till the stalks begin to shrivel next the Branch, that being a sign that the Fruit receives no more nourishment from the Tree: And in the *Canaries* whence our best Wines come, they let them hang longer. Likewise *Normandy Cider* is generally sweeter and better

better coloured than the *Engliſh*, by reaſon of the through maturity of the Fruit. Therefore it is beſt here to let your Apples hang as long as conveniently they can: For when they begin to drop naturally, its a ſign they receive no more nouriſhment from the Tree; or if their Kernels be black, their colour change, or their ſcent be high, they may be ripe enough to gather: But *Deux-Ans* and other hard Fruit, may be gathered in a dry time, in *October*, leſt the Froſts impair them: Notwithſtanding they have not thoſe ſigns of maturity, that other more early Fruit uſually have. *Time for gathering Apples.*

Some *Apples* retain a white colour till they are through ripe, as the *White Beling*, *White Wine Apple*, ſome ſorts of *Pepins*, *&c.* ſome alſo are yellow before they are through ripe, as the *Orenge-Apple*, *Golden-Pepin*, *Kirton-Pepin*, &c. their ſcent doth not always indicate the time of their maturity, ſeveral Winter or late ripe *Apples* not obtaining ſuch ſcent or fragrancy, until they have lain ſome time on Heaps, or in large Veſſels, where they perfect their maturity by their acquired heat, more than they could do on the Trees.

The

Laying them on Heaps.

The best way therefore is after your *Apples* are gathered off the Trees, to lay them on Heaps, or put them in large Vessels in a dry place, and let them there remain two or three Weeks, more or less as the *Apples* are in maturity, which concocteth their Juice, and very much improveth it, and washeth the more phlegmatic parts of the Fruit by sweeting; and also (by a degree of putrifaction) weakneth the *Branchery* or *Veins* that unite the *Parenchymous* parts of *Apples*, especially the more tough sort of *Deux-Ans*, *Westbury Apples*, *Leather-Coats*, *Oaken-Pins*, &c. making them to be more easily broken in the Mill, and more freely yield their Juices: For these tough and harder sort of Fruits ought to lie till the end of *November*, or till *December*, before their Juices be throughly mature, and their *Parenchymous* parts made soluble; and then will these Fruits yield you the *finest*, *strongest* and most *spirituous Cider* of any other: Their *Juices* having been longer from their first formation on the Tree, to their dissolution in the Mill, in a continued state of digestion and conction, than other softer Fruit.

It

It is alſo obſervable, that the more difficultly Apples part with their Liquor in the Preſs, the thinner it is, the ſooner it becomes fine, and the more it encreaſeth in *beauty*, *colour*, and *ſtrength*: Therefore *Apples* eaſily yielding great quantities of Liquor are not always to be deſired, by thoſe that affect the beſt *Cider*.

Apples over-ripe or rotten, make no good Cider.

Some have pretended an indifferency, whether their Apples have been rotten or not, ſuppoſing that their *Cider* made of Fruits part ſound and part rotten, is of equal goodneſs to that which is made of all ſound Fruit; and others have eſteem'd that made of rotten Fruit only, to be the beſt. But neither of theſe certainly ever made any very good of ſound Fruit, for if they had, they would without doubt have altered their opinion. For Apples having lain over-long on heaps till they are pulpy, and part rotten, will yield a thick Juice from the Preſs, difficult to be ſeparated from the *Murc*, which will be long before it be fine, and much of it will be waſted by reaſon of the great quantity of the pulp of the Apple that will be preſſed out

with it, and must be separated from it. And then the *Cider* will not be so good as that made of sound Fruit well ripened. Therefore the middle way is the best, as hath by experience been observ'd.

Of the cider-Mill. Next to the gathering and hoarding of your Fruit, the grinding them is to be considered. No *Mill*, *Engine*, *Art*, or *way*, having been yet used or discovered, better than the *Mill* described in my former Treatise of this Subject for the expeditious, easie, and even grinding of Apples, the Mill being easily portable standing in little room, and of small price, considering the quantities of Apples that in a little time may be ground by it. One Man may grind in this *Mill* of the *double Roll*, in one day, as many Apples as a Horse can in a Horse-Mill in three days. This Mill costing from 3 *l.* to 10 *l.* and a Horse-Mill from 20 *l.* to 30 *l.* with the room it is to work in. This taking up no more room than an ordinary Chest, and may be easily removed as occasion requires. The other must remain always fixt.

This *Mill* grinds the Fruit even, bruising every part, yet breaketh not the Kernels.

Kernels. The other grindeth it unevenly and breaketh the Kernels which prejudiceth the *Cider*. These new Mills of both sorts were made of several prizes, as you would have them for dispatch, by Mr. *Henry Allen* at the *Cabinet* in *Exeter street* near the *Strand* in *London*, and now by many other ingenious Work-Men.

Ordering the Pulp after grinding.

After the Apples are ground, if they were very mellow, it is good to press the pulp the next day, lest the too long standing occasion heat and an ill savour, and the Liquor not so easily separable from the *Feces* or Marc, which will then strain out with the Liquor.

But if the Apples were tough or hard, the long standing of the Pulp dissolves the more obdurate Particles, weakneth the Branchery of Veins that pass through the whole fleshy part thereof, by a certain and advantagious degree of putrefaction, which makes it yield its Liquor the more freely, and is in some degree a maturation of it, as well as whilst it was in the whole Apple; also the long standing of the *Pulp* after it is ground, gives the *Cider* a better tincture than otherwise it

would have, which it attracts from the *Pill* or *Skin* of the *Apples*.

For the redneſs of the *Skin* in the *Pulp* lying long together with it, gives a tincture to the *Cider*, as doth that of *Grapes* to *Wine*. For the Grape whereof Claret is made, yieldeth a pale Wine as ſoon as it is preſſed; but ſuffered to continue ſome days on the red Husk, obtains the tincture it hath when brought to us.

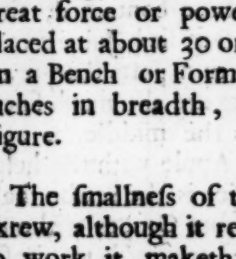
Of the preſſing of Cider.

As to the preſſing of *Cider*, although the greater Skrew-Preſſes make the quickeſt diſpatch, and preſs the hardeſt of any, yet for private Families they are chargeable and cumberſome, nor is it neceſſary to make ſo hard a preſſure as is uſually made by them. I have ſeen a Preſs made with an Iron-Skrew, that by it the Juice hath been ſo clean expreſſed, that it left the *Murc* almoſt dry enough to burn. There was at that place *Cider* made of *Redſtreaks*, *Golden-Rennets*, *Golden-Pepins*, *Gilliflowers*, and other of the beſt of *Cider* Fruits, and ſpecifically each by it ſelf, a Hogſhead at leaſt of each ſort. But by reaſon of the too fine grinding and extream dry preſſure, the moſt curious Palat could diſtinguiſh but

but little difference in the Taſt, which was none of the beſt in every ſort. It was alſo ill-coloured and very cloudy; the laſt and much enforced Juice being very poor, and carries with it too much of the lignous part of the Apple, which had been more proper to have been left behind. For as all vinous Fruits have their pureſt part next the Skin or Pill, ſo is their richeſt Juice there contained, the *Sun* and *Air* maturating ſuch Juice more perfectly on the extream parts than near the Core. The Pores are alſo much finer there than towards the middle, as appears in a diſſected Apple with the help of a *Microſcope*, which is the reaſon that Wines proceeding from Grapes without much preſſure, are preferr'd to thoſe that are more preſſed, and the pooreſt Wines are thoſe that are with the greateſt force extracted. All which conſidered, it is better to have nine parts of pure rich *Cider*, than ten of that which hath neither good Taſt nor colour. Therefore ſo great a Preſs is not abſolutely neceſſary in the making of good *Cider*.

A new ſort of Preſs.

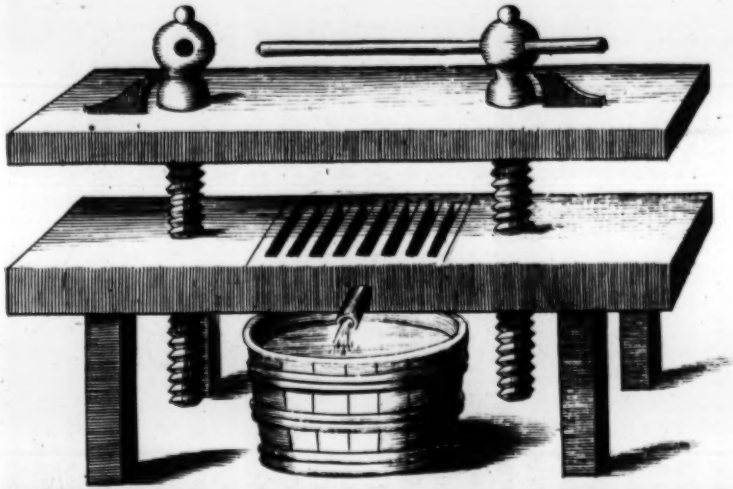
As one of the conveniencies of the Mill is to ſtand in a little room, and to be portable with eaſe from one place to another; the ſame is neceſſary in the Preſs, which may be made with two woodden Skrews, of about the ſize of the Skrews which the *Apothecaries* uſe in extracting Oils, *&c.* which have a very great force or power with them, and placed at about 30 or 36 Inches diſtant, on a Bench or Form of about 20 or 24 Inches in breadth, according to this Figure.

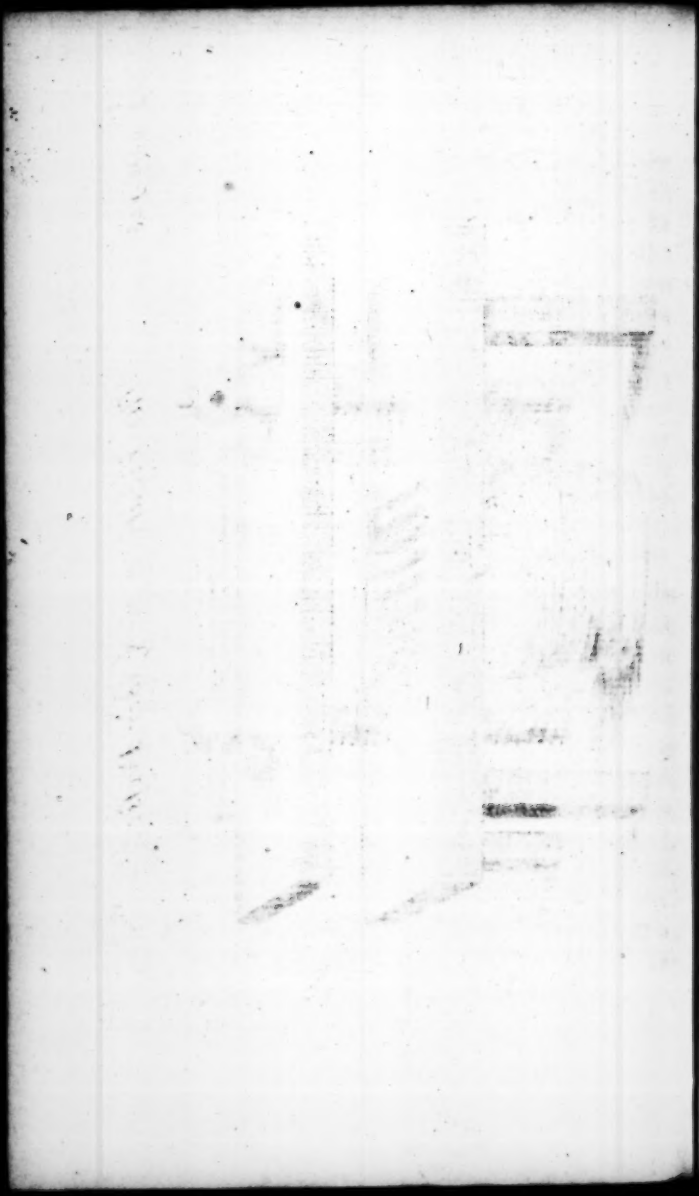


The ſmallneſs of the Thread of the Skrew, although it requireth more time to work it, maketh it preſs the Murc much the harder; but you muſt remember to fix the lower plank to ſome Poſt or Wall, by pieces extending from thence to the Preſs to keep it ſteady; with this may you preſs any quantities, ſmall or great at any time without much trouble; it is eaſily made, and requires but little room. And after your Vintage is over, you may ſet your Preſs as well as your Mill, in ſome by-place, till the next Seaſon requires its uſe again.

The

page 128. *The Figure of the Cider Preſſe.*





Ordering of Cider after it is preſſed.

The Principal Cauſe that there hath been ſo much bad *Cider* made in moſt parts of *England*, was the too early ſtopping of it up. It being uſually preſcribed, and as uſually practiſed, that as ſoon as *Cider* is preſſed, ſtrained and fermented, they ſtop it cloſe, with a very great confidence that unleſs it be cloſe ſtopt it will decay, and become of no uſe. So that when theſe *Ciderifts* have taken care for the beſt Fruit, and ordered them after the beſt manner they could, yet hath their *Cider* generally proved pale, ſharp, ill taſted, *&c.* and all from the too early ſtopping of it. For the ſtopping of *Cider* cloſe before it be fine, or with its *Feces* in it (although precipated) begets reiterated fermentations, which fermentations very much impoveriſh this Liquor, by precipitating thoſe Particles which enrich it with *Tincture* and *Guſt*.

Whilſt its groſs *Feces* or any ſetling remain in the bottom, every change of Weather cauſes ſome motion therein, which is uſually termed Fermentation: This doth ſo attenuate this Liquor, that it eaſily letteth or ſuffereth thoſe Parti-

cles to ſubſide, and leaveth the *Cider* thin, jejune, acid, and ill taſted. It is thin and jejune, becauſe it hath loſt its ſubſtance; acid, becauſe it hath loſt its ſweetneſs, thoſe Particles being the Saccharine ſubſtance, or part of the Apple, and of ill ſavour and guſt, becauſe thoſe Particles when precipitated, being mixt with the more groſs, do putrifie and heat, infecting the whole maſs in the Veſſel, all which effects are apparently obvious in *Cider* made after the Vulgar method. Theſe *Feces* they are that cauſe the Corks to fly out of the Bottles, or break the Bottles; or at leaſt the opening of them makes the *Cider* fly, and mixing with it make the reſidue unpleaſant.

The various Art's uſed in mending of Cider.

Theſe things being generally taken notice of, hath ſet many heads at work to provide remedies. Some have made uſe of many ways to ferment it, and make it clear by reiterated Fermentations; others by additions, as *Iſing-glaſs*, &c. have enforced a precipitation; and when they have ſo done, finding it to be thin, pale, and acid, have by *Molaſſes*, *Treacle*, or *courſe Sugar*, given it body, colour, and guſt. What delight or pleaſure there can

can be in drinking ſuch Compounds; or how much this muſt conduce to health or long life, I leave every unprejudiced and ingenious Man to judge.

There are others that when their *Cider* is thus reduced to a jejune and an unpleaſant Drink, they take one Veſſel, and with an Alembick extract its Spirit, and add the ſame to another under the ſame circumſtances of poverty and unpleaſantneſs, and then edulcorate it with *Molaſſes*, *Treacle*, &c. which alſo gives it tincture. Theſe and many other Arts are uſed to ſophiſticate, corrupt, and debaſe, this otherwiſe pleaſant and wholſome Drink.

Rules in making good Cider.

To prevent not only the decay of *Cider*, but the extraordinary trouble in curing and amending it. When it is preſſed let it ſtand a day or two, or more, in an open Tun, or covered only with a Cloth or Boards to keep it from the duſt, or in a Hogſhead or other Veſſel, not quite full, with an open Bung, till the more groſs parts ſubſide: Then draw it into Pails, and fill it up into the Veſſels you intend to keep it longer in, leaving about an eighth part empty. Set theſe

these Vessels in your coldest Cellars or Repositories, with the Bungs open, or covered only with a loose Cover, that there may be a free perspiration of the volatile Spirit of your *Must*, which would otherwise force its way; and that your *Must* may be cool, and not kept warm, lest it ferment too much.

Thus standing open, and the more open the better, it will by degrees let fall its grosser parts, and in time become clear without the loss of any of its true and durable Spirit. For coldness is here the cause of its purifying, warmth occasioning the solution and detension of those Particles that spoil the colour and tast of *Cider*, and which otherwise would precipitate.

As for the time of its standing open in the Vessel, it varies according to the nature of the Fruit; If the fruit were mellow or sweet, the more of the gross particles be pressed out with the Liquor, the longer time will be required for their precipitation: But if the Fruit were hard or sharp, the thinner doth the Liquor issue out of the Press, and the sooner will your *Cider* become fine; and you must be sure to observe, that as soon as

as this *Cider* of hard Apples is fine, you draw it off from its precipitated Lee, left it become acid, or acquire ſome ill taſt from it.

This ſtanding open of the Veſſel cauſeth an expence of that wild or volatile Spirit, which being pent in, would beget a continual fermentation much prejudicing the *Cider*; and in caſe it doth not otherwiſe work its way out, would in time break the Veſſel that detains it.

Ordring of Cider in the firſt Racking.

After your *Cider* hath ſtood open ſome reaſonable time, till it is become indifferently fine, which it may be in three, four, or five weeks; then will it be convenient to draw it into Bottles, if you have a ſufficient ſtock, or into other Cask, that it may there become more fine. For after it is ſeparated from its groſs *Feces*, it will more eaſily demit the remaining Particles or flying Lee, than it would have done whilſt the groſſer parts remained, renewing its fermentation on every change of Air, or other accidental occaſion.

Its fineneſs will ſometimes plainly appear, if you move the ſcum aſide with a

Spoon

Spoon, or the like; but to be more exact, you may take a Glaſs-Pipe of a Foot or more in length, open at both ends, ſtop the upper end of the Pipe with your Thumb, and let the other end down into the *Cider* as deep as you think fit, then open the upper end by removing your Thumb, and the *Cider* will riſe in the Pipe: Then ſtop the upper end again with your Thumb, and take out the Pipe, and hold it over a Drinking-Glaſs, remove your Thumb, and you may there diſcern the ſtate and fineneſs of your *Cider*.

If your ſtock of *Cider* be not overgreat, or that you are willing to preſerve your choiceſt ſorts of *Cider*, the beſt way is to have large Glaſs-Bottles of one or two Gallons apiece, more or leſs, enough to receive the ſame, into which draw off or rack your *Cider*, and let the Bottles ſtand open, or but barely covered in your cooleſt Repoſitory for a month or more, till you obſerve your *Cider*, by your interpoſing it between a Candle and your Eye, to be very tranſparent, which then may be called Superfine, the remaining Particles or flying Lee

Lee being precipitated and ſetled in the bottom of the Glaſs-Bottle.

If your quantity of your choiceſt *Cider* be too great for your Bottles, you may inſtead of them make uſe of Stone-Bottles, or Jarrs, or Stounds of Flanders-Earth, or glazed Earthen Veſſels, the larger the better, which may be placed in Rows in your Repoſitories, Cellars, or Vaults, and covered with Boards, or the like, to preſerve your *Cider* from duſt, *&c.* but not from the Air. But by reaſon that you cannot ſo eaſily diſcern the fineneſs of your *Cider* in theſe as in the tranſparent Veſſels, you may now make uſe of your Glaſs-Pipe beforementioned.

The reaſon why Glaſs-Bottles, or other glazed or ſtony-Veſſels are more fit for this ſecond fining, than thoſe of Wood, is, for that the coolneſs of the Veſſel very much contributes to the precipitation of thoſe remaining Particles that would otherwiſe debaſe this excellent Liquor.

But if your quantity of *Cider* be ſo great, that theſe Veſſels cannot receive it, then may you rack it into other Veſſels made very clean, dry, and ſweet, and ſuffered

suffered to stand slightly covered till it be very fine, before you stop it up. If you find that your *Cider* doth not fine in wooden-Vessels so soon as you desire, for want of that coldness that is in the glazed Vessels, you may take Flints or pebble-Stones clean and dry, and put them into your Cask of *Cider*, this is said (and with great probability) to contribute much towards the nimble precipitation of the *Feces*. The like effect hath the applying of a bag of Salt to the outside of the under part of the Vessel.

Ordering of Cider after it is super-fine.

When your *Cider* hath attained its utmost degree of fineness, which after this way of ordering it will do, if you have but patience to let it stand open long enough, although some will fine in half the time that other requires: Then take your Glass *Syphon* or *Crane* and draw it off from its last *Feces* into smaller Bottles, wherein you intend to keep it for your use. Thus being drawn off, and throughly depurated, you may close cork all your Bottles, and place them in your cool Conservatory; where after a few weeks standing your *Cider* will acquire a fine briskness, and mantle in the Glass

Glaſs without any manner of feculency, and retain its firſt ſweetneſs, and change from a pale to a lively Canary or Malaga-colour; but if you have occaſion to accelerate its maturity, place ſo many of your Bottles as you think you may have ſudden occaſion for, in ſome place warmer than your uſual Conſervatory, and it will ſoon anſwer your expectation.

Sometimes it will happen that the next Summer after it is become ſo pure, ſome Raggs or flying Feculencies may appear in your Bottles, which are occaſioned by the warmth of the ſeaſon begetting another fermentation from the fatneſs of the body of the *Cider*, made of the ſweeter ſort of Fruit, which are not apt to appear in the thinner *Cider*, but in ſome ſhort time theſe will ſubſide, and you may draw off the fine from the *feces* with your *Syphon*, without any great prejudice to your *Cider*: Theſe later fermentations in great quantities of *Cider* often ſpoil it for want of a timely prevention, which cannot be ſo well done in Veſſels of Wood as thoſe of Glaſs, where you may eaſily perceive the

the various changes that may happen in theſe Liqours.

To make Syphons or Cranes.

Theſe *Syphons* are beſt made of Glaſs, but becauſe that at the *Glaſs-houſes* the Workmen will not preſently apprehend how to turn them fit for this uſe; You may buy at the Glaſs or Potters-Shops thoſe Tubes or Pipes that are made of white or flint Glaſs for *Barometers* or *Mercurial Weather-Glaſſes*, which may be carried in a long Caſe to any place in this Kingdom.

Make a fire of *Charcoal*, or ſuch like clear fire at ſome diſtance from the back of the Chimney or Wall, and put the cloſe end of your Glaſs-Pipe into the fire, and when it is hot, dip about an inch of it in the water, and it will break off, then is your Pipe open throughout.

Then lay the Pipe acroſs the fire (by a gradual acceſs, leſt the ſudden heat crack it,) that for about five or ſix inches ſpace near the middle it may be red-hot, yet ſo that the one end may be two or three inches longer from the hot part than the other: When it is thus hot, hold both ends of the Pipe, in each hand one end, bend it to the Form deſcribed

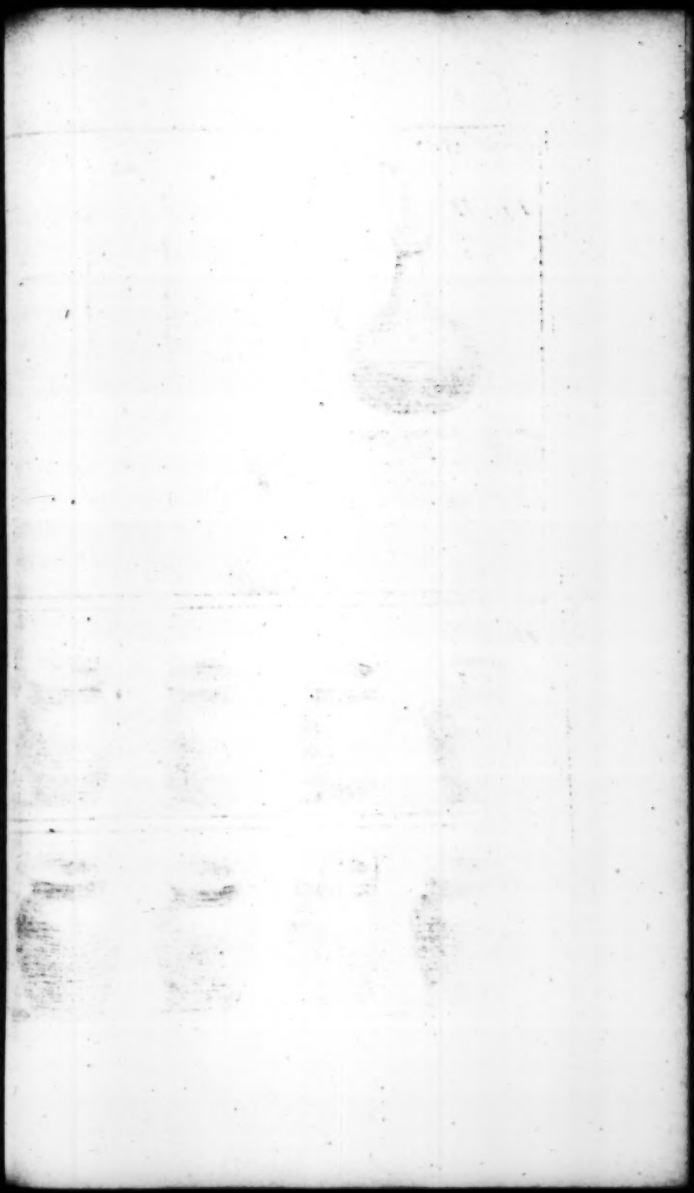


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Fig II

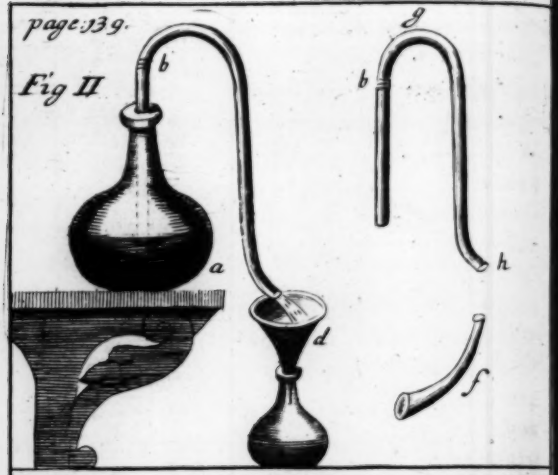


Fig II

ſcribed at (*g*) then cool it (by a gradual taking it from the fire, leſt the ſudden cool Air break it,) and when it is cold enough to handle, put the longeſt Leg of your *Syphon* into the fire, and when it is hot turn it into the form as at *b*; but becauſe the end will be too hot to touch with your hand, you may manage that end with a pair of Tongs.

As for the ſize of the Pipes let them not be of too ſmall a bore, for then will the *Cider* be too long in drawing off: And as for the length, you may have of ſeveral lengths, that they may ſuit with your greater and leſſer Veſſels and Bottles, and as near as you can proportion the ſize of the bore to the length of the *Syphon*, that your *Cider* may flow faſter out of the larger than out of the leſſer Veſſels.

The uſe of the Syphon.

The manner of uſing theſe *Syphons* is thus deſcribed: Firſt place the Bottle or other Veſſel out of which you are to extract your fine *Cider* from the ſetled Lee, on a Table or Shelf as at *a*.

Remember before you may uſe of your *Syphon* to whip about that Leg that

is to be put into the Bottle two or three turns or more of Yarn or Worſted, as at *b*, which may ſlide up and down as there is occaſion.

Then put that end of the *Syphon* into the Bottle gently as deep as it will go, and move the Ring of Yarn to the very depth of the Bottle; then raiſe your *Syphon* ſo high as that the lower end of that Leg that is in the Bottle may be ſomewhat above the Lee that ſubſided in the Bottle, for which the Ring of Yarn will be your guide, as at *b. c.*

Then hold your Receiver, being the Bottle into which you intend to draw your fine *Cider*, and to preſerve it, with a Funnel on it, as at *d.* Then whilſt one holds the ſhorteſt Leg of the *Syphon* at b. let another ſuck at the lower end of the outward Leg, till he perceive the Liquor draw towards the end of the *Syphon*, then let him deſiſt, and apply the Recciver and Funnel, as at *d.*

Or you may whip about the crooked end of the *Syphon* with Worſted or Yarn, and procure a ſhort piece of Glaſs, Laton, or other Metals crooked, as at *f.* the one end being wide enough to cover the mouth of the longeſt Leg of the *Syphon*, which

which being applied to the *Syphon*, on the Worſted or Yarn, to prevent the Air from freely paſſing between, you may ſuck at the ſmall end of the Pipe *f.* and when you perceive the Liquor to depend to the end of the *Syphon*, take away the Pipe *f.* and apply the Bottle and Funnel.

When you perceive your Receiver to be full, ſtop the mouth of your *Syphon* with your Finger, and apply another to it until all that is fine be extracted out of the Veſſel from which you draw it, which you may perceive by your Glaſs *Syphon*, for you may gently ſink the *Syphon* at *b.* with your Finger, till you perceive ſome Cloud or foulneſs to ariſe, and then keep it a very little higher, that it may come pure, whereby there will be nothing left in the bottom of the Veſſel out of which you extract your *Cider*, but what is meer *Feces*, with very little waſt; however you may pour out all the *Feces* into ſome other Bottle or Veſſel, and let them ſtand until they are again ſetled, and you may then extract the fine as before, ſo that there may be almoſt no waſt: Thus may great quantities of *Cider* be drawn off in a little

time by two persons, when they are once set about it, and you will soon find the benefit of it.

An Error corrected.

In the first part of this Treatise, I prescribed Fermentation to be a means to purifie *Cider*; and alledged that warmth was a principal help to provoke the same, as in truth it is: But such Fermentation that was at that time by many made use of, did very much prejudice *Cider*, and therefore to be prevented; There being no other Fermentation required in preparing the choicest *Cider*, than only exposing it to the open *Air*, that the volatile Particles may evaporate, and the *Feces* subside, which otherwise would beget a reiterated Fermentation, not only to the impoverishing of, but giving an ill Taste to that which otherwise would prove the best *Cider*. The subsiding *Feces* having an ill Taste and Smell, easily impart it to the *Cider*; as lately happened to one that by the advice of an ignorant *Ciderist*, after he had drawn off his *Cider* from the Lee or *Feces*, put the said *Feces* in a flannel Bag, usually called *Hypocrates his Sleeve*, through which the *Cider* finely distilled, and

and was very pleasant to the Eye, but not drinkable by reason of its ill Taſt and Savour which it received from the *Feces*, ſo that in caſe the *Cider* ſo drawn off had ſtood long on thoſe *Feces*, that Taſt and Savour had infected the whole quantity, though not in ſo high a degree as it did the ſmall part diſtilled through the Flannel.

Of Veſſels for the keeping of Cider.

Some perſons have made great quantities of *Cider*, and at the ſame time have diſpoſed it into ſeveral Veſſels. But the *Cider* although alike at the running it up, yet at the drawing it forth, hath proved of different Taſt and other qualities, which very much perplexed the curious Obſervators to find out the cauſe of ſuch variance. At length they did obſerve that in all thoſe Veſſels that were made of the *white Oak*, the *Cider* was well coloured, and of a good Taſt; but in thoſe that were made of brown or red Oak, it was it contrary, ſo that they concluded the faults or defects of *Cider* to be from the Veſſel. *Quere* Whether the upright Veſſel whoſe Ribs are ſtreight, being made of *Firre*, may not be very proper for the keeping

of *Cider*, it being probable that ſuch taſt and colour that may at the firſt be taken from the Firre, may rather mend than marr the *Cider*; however it will be ſooner extracted from it than from the Oak.

Earthern Veſſels the beſt.

As for Hogſheads or other Veſſels made of Wood (when new) they are apt to ting the *Cider* with an ill colour, and give it an ill Taſt; and when they have been uſed, although with the ſame ſort of Liquor, they retain ſome tartarous matter which diſturbeth the *Cider* newly put into it, and ſometimes ſo much that the *Cider* will hardly ever be clear; therefore the leſs time that *Cider* remains in the wooden-Veſſels the better it is: But to prevent ſuch ill effects, Experience hath taught me, that open Veſſels of Glaſs, or glazed-Earth are the beſt, not only for the retaining the natural guſt and colour of the *Cider*, but for the better and more expeditious purifying of it, having ſeveral times put ſmall quantities of *Cider* from the Preſs, formerly in Jar-Glaſſes, and ſince that in glazed Earthen-Pots, which in the ſame manner hath rendred the *Cider* much

much exceeding that, which at the ſame time, and of the ſame ſort, hath been put in wooden-Veſſels and narrow-mouth'd Glaſs Bottels.

Therefore if you take Earthen-Veſſels glazed within that will hold four or five Gallons each (more or leſs) as many of them as will contain the *Cider* you make, and ſet them in Rows on the Ground and on Benches in your Cellar or Repoſitory, and fill them with *Cider* from the Preſs, and let them ſtand open, or but ſlightly covered four or five Weeks, or more, till the *Cider* be throughly fine, you may then Crane it off into Bottles for uſe; or you may by emptying one of the Veſſels draw it from the next into that which is empty, and ſo go round till all be drawn off; and then let it ſtand another month without the Lee till it be Superfine, and then draw it off into Bottles for uſe. If you live near a *Potters* you may have theſe Veſſels made with Tap-holes about two inches from the bottom, and ſo may with a Cane or ſmall Tap draw it off without the uſe of the *Syphon*, and leave the *Feces* behind.

These Vessels, all things considered, are cheaper than Barrels or Hogsheads of Wood: First, for that you have more by the Gallon for your mony of the Earthen than of those made of Wood; then will they last longer (with care;) for after the *Cider* is drawn off, you may scald them, and set them by, with their bottoms uppermost till another year, without danger of growing Musty, or want of hooping.

In the Cellar or Conservatory, they stand as in Figure 11; and when you have drawn off the upper Rows on the Benches, you may then set those on the Ground, and upon the Benches in the room of the other, and so draw them off likewise; you may have also two or three Rows the one above the other.

Divers Ciders out of the same Apples.

Besides the observing of the time of gathering and grinding of Apples, which causeth a great Variety of *Ciders*; there is in the same Apple such a difference in its parts, that the one part produceth a better *Cider* than the other. In oblong Pears the best part is that which is next the tail, that being the smallest end, the whole

whole ſubſtance of the Fruit paſſing throgh it, is the cauſe why that part is the beſt. In Apples the outſide is the beſt, being more maturated by the Sun and Air than next the Core, and there is the richeſt Juice contained; the Pores are alſo much finer there than towards the middle, as appears in a diſſected Apple by the help of a Microſcope. In Grapes the richeſt Juice is alſo next the Skin, and moſt eaſily expreſſed, which is the reaſon that Wines proceeding from Grapes, lying in large Veſſels without any other preſſure than their own weight, are much more excellent than thoſe that are forcibly expreſſed, which by all are found to be the pooreſt.

Therefore if you intend to have a more rich *Cider* than is ordinarily made out of the ſame Apples, you may pare the outſide of your Apples about the thickneſs of a Crown-piece of Silver, and grind theſe thick Rinds very fine (laying by the inſides to make a meaner ſort of *Cider*) by which you will ſoon find the difference, as well in colour as flavour.

But

Diverſly coloured alſo.

But if you will have a rich coloured *Cider*, take of the reddeſt ſort of through-ripe *Gillyflowers* in *November*, and pare about a third or fourth part of them you intend to grind as thin as an old Six-pence, lay theſe parings by, then grind your Apples and preſs your *Cider*; afterwards when your *Cider* is diſpoſed of into its proper Veſſels (of which the Glaſs or Earthen are the beſt) add the parings you laid by, and let them remain in the *Cider* 14 days more or leſs at your diſcretion, and when your *Cider* is fine, draw it off from thoſe parings; and although your *Cider* at the firſt ſeems not to have much of the colour of the parings, yet will it be ſo much improved by them, that in a few weeks its colour, guſt, and flavour will excel that which ſhall be made by any other way or method; and the richer will it be if made of the Rinds pared thick, ground and preſſed without the inſides, as before is directed.

An Error in making Currant Wine corrected.

In the firſt part of this Treatiſe, I intimated that by letting *Currants* hang on the Trees ſix or ſeven weeks after they are

are red, would digeſt and mature their Juice, that it needed not that large addition of Sugar which otherwiſe it would do; which I concluded to be true, becauſe all or moſt of other Fruits become ſweeter by hanging long on the Trees after they are ripe, as *Grapes*, *Cherries*, *Plums*, *Gooſeberries*, &c. But now I have obſerved that Currants only by long hanging on the Trees, after they are ripe, become more acid. Therefore they ought to be gathered as ſoon as they are through ripe, if you intend to make *Wine* of them. But if you intend them for *Vinegar*, the longer they hang the better, and this is the beſt uſe their expreſſed Juice can be put unto, it making the beſt Sauces of any other acid Juices; and its *Wine*, unleſs kept till the Sugar and the Liquor are throughly incorporated, is none of the moſt grateful to the Stomach.

To make Apricock-wine.

Take a pound and a half of Loaf-Sugar, the finer the better, to which put three pints of Spring Water, and ſo in that proportion for a greater and leſſer quantity; ſet this over the fire until it boil, and after you have clean ſcum'd it, take

take a pound of Apricocks through ripe to each pint of Water, pare them thin, and ſtone them, and put them into the Liquor, and let them be boiled therein until they become tender; then take the Apricocks out, and put a Sprig of floured Clary into it, and after it hath boiled a little take it out, and let the Liquor cool; and when it is through cold put it into large Bottles, and let it ſtand eaſily ſtopt till it be very pure or fine, then Crane it off into quart or pint Bottles as you pleaſe, and cloſe ſtop and keep it for your uſe.

Note that the Wine is really a Sugar-Wine, and the finer the Sugar is the whiter will your Wine be; and it receives a very fine reliſh from the Apricocks, which yet remain firm and undiſſolved, and are fit for your Confectionary. The Clary gives it a Guſt like Canary Wine: If you keep this Wine two or three years till the Sugar is perfectly diſſolved or digeſted in it, it becomes one of the beſt of Artificial Wines. *Probatum eſt.*

After

After the ſame manner may you ting *Sugar-Wine* with *Rasberries*, without leaving the juice or ſubſtance of the *Raſberry* in it, which is apt to corrupt it. Or you may ting it or give it a guſt with any other Fruits or Flowers. *To make Rasberry-wine.*

I have formerly given you ſome accompt of the nature of the *Cacao*, with the manner of compounding of the Vertues of *Chocolate*: I have little more to add, but that ſeveral Authors of the *American Hiſtories* have at large ſet forth the great Values that are ſet on the *Cacao* Nuts in thoſe parts, being eaten without any preparation, ſatiating, and not cloying the Stomach. But much more on *Chocolate*, which the *Europeans* learned to make of the *Indians*, which they looked upon as the greateſt delicacy for their extraordinary Entertainments, and which they offered to the *Spaniſh* conquering Generals, as the beſt Collations they could give them; and is of ſo common uſe there, that the *Spaniards* conſtantly drink the ſame in their Churches. *Of chocolate.*

Some eſteem that which is made of the Nuts alone, made into a Paſt and diſſolved

diſſolved in Water; others with the Nuts made into a Paſt with Sugar, and ſo diſſolved in Water, wherewith many Indians and Chriſtians in the *American* Plantations have been obſerv'd to live many months without any other Food.

Its Vertues are very eminent in fortifying the procreative faculty; it preſerves Health, and impinguates, cauſeth a good Digeſtion, is very Reſtorative in a Conſumption, and is good in the Cough of the Lungs, Plague of the Guts, and other Fluxes, the Green-Sickneſs, Jaundiſe, and all Inflammations and Opilations, Sweetens the Breath, provokes Urine, Cures the Stone and Stangury, expels Poiſon, and preſerves from all Infectious Diſeaſes.

Of coffee. *Coffee* is a Drink ſo generally known, that I need ſay little as to the preparing it: The Berry is imported by the Merchants from *Arabia* and other Eaſtern Countries: The Berry or the Powder is to be bought at moſt *Coffee-Houſes* in *London*. Its preparation is to mix an ounce of the Powder with a pint and half of hot Water which hath been boiled half away; after the Mixture it is to boil

boil a while, till the water be well tinged with it.

Its Vertues are that it indiſpoſes the Body to ſleep, and ſo is good for thoſe that affect late Studies: It allayeth the Heats and Fumes that ariſe from a full or foul Stomach, and ſo is good after a Debauch in eating or drinking: It is proper in Headaches, Dizzineſs, Lethargies and Catarrhs, where there is a groſs habit of Body, and a cold heavy Conſtitution, and very effectual in opening Feminine Obſtructions.

But to lean and active Bodies *Coffee* is not agreeable, nor good for uxorious Men, it incapaciting them for thoſe pleaſing Exerciſes Nature of it ſelf inclines them to, and often renders the Drinkers thereof Paralitic, it being a kind of Opiat. Its ſaid, the *Perſians* drink it, to allay their Natural heat, that they may avoid the charges and inconvenienes of a fruitful Family. So that taking its good and bad effects together, its good for nothing; but with Tobacco to entertain thoſe that are at leiſure to diſcourſe about the Intrigues of the Town, and ſometimes of the general Affairs of the World.

Its

Of Tea. Its preparation I have touched upon before: As for the Qualities and Virtues of it, I will add something to what hath been written in the first Part; it hath much of the same Vertue as Coffee, by inabling Men that drink of it, to Lucubrations or late Studies, by driving off sleep; yet without those ill effects that Coffee commonly produces; it makes Men active and lively, which Coffee doth not; It clears the Head, and opens the Urniary passages; it prevents Drunkenness, taking it before you drink Wine; for being drank hot, it fills the Veins and other vacancies, which otherwise would attract the Wine. Its a great dryer, and therefore no Enemy to Chastity. It removeth the Obstructions of the Spleen and Gall: It is good against Crudities, causeth a good Appetite and Digestion. It vanquisheth Dreams, easeth the Brain, and strengtheneth the Memory. These are the Principal, but there are many more Vertues attributed to this, the best of our small Water-drinks; and certain it is, that many ancient Men since the use of it in *England* have preserved themselves very lively, considering

ing their great Age by the constant use of this Drink, which is not to be slighted.

Of the extract of Juniper-Berries.

A late Author having written the Natural History of several Leaves and Berries, introduces Juniper-Berries to have many extraordinary Vertues, and directs that an ounce of them well cleans'd, bruis'd and mashed, will be enough for a pint of Water; when they are boil'd together, the Vessel must be carefully stopt; after the boiling is over, add a spoonful of Sugar-Candy; the effects are extraordinary in the Stone and Wind-Collick. The extract of this Berry is also commended in many other Distempers, of which almost every Physical Author Treats, and most of our Country Doctors prescribe the use of it.

Of Mum.

Mum is not only become a common Drink in many places of this City, but a very wholsome Drink, and may without doubt be made as well here as in foreign Parts, we having all the same Materials whereof it is compounded. The Receipt is published in the before-men-

tioned Natural Hiſtory, which he ſaith is recorded in the Houſe of *Brunſwick*: And is to this effect, Take 63 Gallons of Water that hath been boiled to the Conſumption of a third part, then brew it with ſeven Buſhels of *Wheat-Malt*, one Buſhel of *Oat-Malt*, and one Buſhel of *ground-Beans*; Tun it, but fill not the Hogſhead too full at firſt; when it begins to work, add to it of the inner *Rind* of the *Firre* three pounds, of the tops of the *Firre* and *Birch*, of each one pound, of *Cardnus Benedictus* dried three handfuls, Flowers of *Roſa ſolis* two handfuls, of *Burnet*, *Betony*, *Marjerom*, *Avery*, *Penny-Royal*, Flowers of *Elder*, *Wild-Thyme*, of each one handful and a half, Seeds of *Cardamum* bruiſed three ounces, *Barberries* bruiſed one ounce, put the Seeds into the Veſſel.

When the Liquor hath wrought a while with the Herbs, and after they are added, let the Liquor work over the Veſſel as little as may be; fill it up at laſt, and when it is ſtopt, put into the Hogſhead ten new laid *Eggs*, the Shells not crack't or brok'n; ſtop all cloſe and drink it at two years old; ſome add *Water-Creſſes*, *Brook-Lime* and *Wild-Parſley*,

ſley, of each ſix handfuls, with ſix handfuls of *Horſe-Radiſh*, raſped in every Hogſhead: It was obſerv'd, that *Horſe-Radiſh* made the *Mum* drink more quick than that which had none. If *Mum* be carried by Water it is the better. *Thus far the ſame Author.*

Mum, *Ale*, *Beer*, and all ſuch groſs bodied Liquors are much refined by carrying them by Sea, and drink much better after ſuch motions than before.

This Liquor thus prepared is very ſtrengthening from the *Malt* and *Beans* it is made withall, and is a great cleanſer of the *Reins*, and good againſt the *Stone* and *Scurvy*, from the great quantity of the *Firre* that is uſed in it, being of a Terebinthine-Nature, and much more wholſome than Hops: The Eggs preſerve it from being ſour, which otherwiſe in ſo long time it may be ſubject to, by reaſon many of the Ingredients are put in green; which if it were made of dried Ingredients it may very well keep as long without any acidity. Green Vegetables being far more apt to flatten and corrupt any Drinks than dry: As thoſe that make compounded *Ales*, *Methegelin*, &c. can teſtifie: And as to the

time of keeping it, nothing is more certain than that ſuch ſtrong compounded Liquors are very much improved by time. All thoſe various and different Ingredients being thereby digeſted into one ſubſtance, not to be diſtinguiſhed by the moſt curious Palat, but purified and made a moſt deſirable Drink, far excelling that crude *Mum* that is uſually ſold to the great diſparagement of that which hath been kept its due time, and was at the firſt duly prepared.

In the firſt part is a Catalogue of Fruits growing in this Nation, and fit to be planted in your Vineyard, to which I have many to add. But finding that Names ſignifie little, and the Natures of them are difficult to deſcribe, He that hath a Will to furniſh himſelf with ſuch that are excellent, may have the Trees of Mr. *George Rickets* of *Hoggſden*, mentioned in the firſt Part, who hath the greateſt variety of the choiſeſt *Apples*, *Pears*, *Cherries*, *Plums*, *Apricocks*, *Peaches*, *Malacbtones*, *Nectorines*, *Figgs*, *Vines*, *Currans*, *Gooſeberries*, *Rasberries*, *Mulberries*, *Medlars*, *Walnuts*, *Nuts*, *Filberds*, *Cheſnuts*, &c. that any Man hath, and can give the

the beſt account of their Natures and Excelleneies.

To my firſt Part I added a ſmall Tract, being a Diſcourſe of the Government and Ordering of *Bees*; and finding that I have here room enough, inſtead of enlarging that, I will ſubjoyn a few Pages by way of Eſſay towards the diſcovery of the Original of Fountains and Springs, for on ſuch things do our Husbandmen ſometimes contemplate, eſpecially when the ſcorching *Sun*, great *Rains*, or darkſome *Winter nights* forbid their Rural Exerciſes: All ſuch times are their Minds taken up with thinking how, and from whence Rains are produced, and from what cauſe Springs ſo plentifully flow, and Rivers ſwell to ſo great a Bulk. To encourage ſuch Enquirers, and furniſh them with new matter to whet upon, I have offered the following Eſſay.

Of the Original of Fountains.

THe Original of Fountains being remote and obſcure, is not ſo eaſily diſcovered, as ſome have thought. Nevertheleſs have many very able Philoſophers attempted to do it; ſome imagining it to be from one, ſome from another Cauſe. I will therefore, amongſt other Obſervators not only, paſs my Cenſure on ſome of their pretended Diſcoveries, but caſt in my Mite of Enquiries amongſt the Treaſures of the Learned, for the finding a more probable, if not their true Original.

1. That Springs proceed from Rains.

The firſt Opinion of the Original or Cauſe of Springs and Fountains that hath inſinuated it ſelf, and is rivited into the Minds of moſt thinking Men, is, that they ariſe from Rains, diſſolved Snows, *&c.* For the Confirmation of which, much hath been ſaid and written.

Reaſons againſt it.

1. Againſt which Opinion, I will offer ſome Reaſons: As firſt, That there is a very great diverſity in the Wetneſs and Drineſs

Drineſs of Years; in ſome Years it rains very much, and in others very little: And eſpecially in the Winter-Seaſons, it being eaſily to be computed that four or five times the quantity of Rains falls in ſome one Winter as doth in another; yet nevertheleſs do the perennial Fountains flow, but little more in the more rainy Winter than in the other; or at leaſt the diſproportion of the Fountains is not anſwerable to that of the Rains: As may very plainly be obſerved in all Fountains iſſuing out of Rocky and Mountainous places. As in this beginning of the Spring 1685. the clear and ſwift Fountain flow-eth with almoſt as full a ſtream from *Alreſford* to *Wincheſter* after almoſt two years drought, as it uſually hath done after the moſt Rainy-Seaſons. And in caſe there be any defect of Water in it now more than formerly, it may be imputed to the attractive vertue of the dry Earth near unto its Springs and Currents in ſo dry a Seaſon, rather than to its Original; the like I have obſerved in all perennial Fountains.

2. That there are many hilly places of ſeveral Miles extent, without any Springs or Fountains in any of the Valleys

amongst them, and the Lands on such high places are fruitful and inhabited; and where the Rains fall equally plentifully, as they do in the lower and larger Vales, yet are the Wells on such high places digged very deep before they come to the Springs, and those Waters cannot be supposed to be compounded of Rains, Snows, *&c.* because Rains not melted Snows descend not so deep. For if they did, then would the Earth, of what nature or kind soever it be, be imbib'd therewith from the Surface, to the resting place of such Waters, and there would necessarily be a continual descent *guttatim*, especially near the bottom of such Wells or resting-places to supply those Fountains, which there is not, as appears in Caves that are deep in the Earth, and Conservatories made for Snow, which are always dry. *Cardanus libro quinto de subtilitate, dicit quod Cuniculos ad evertenda Oppida etiam sub aqua effodiunt*, &c.

3. Another Reason that induceth me to believe that Springs derive not their Original from Rain, dissolved Snow or Hail, is for that there are plentiful Springs and Fountains under so great a quantity

quantity or thickneſs of Earth, Clay, or the like, that is not penetrable, or rather penetrated by theſe Waters that are on the Superficies of it. As is moſt evident on the great Flats near the Sea, which are overflown with Salt or brackiſh-Waters; yet by digging 40 or 50 Foot through a Bed of Clay, a Spring of moſt ſweet Water hath been diſcovered, when as the more Salt or brackiſh-Waters have not permeated through the Clay or Earth to mix with it notwithſtanding the vacuity of the Well was large enough to have received it. And it is as evident within the Land, where ſeveral ſmall perennial Rivers flow, yet very near the ſame, are Wells digged 15 or 20 Foot lower than thoſe Waters where Springs are found, which yield great plenty of Water, that have not their Original from Rain percolated through the Earth; for in caſe they had, then would thoſe Rivers deſcend alſo by the ſame Pores as did the Rain.

A fourth Reaſon is, For that when Rains fall by eaſie Showers (as they generally do) the thirſty Earth imbibes and detains them very near its ſurface, and in a few dry days as eaſily imparts with 4.

with its newly received moisture, that sometimes plentiful Showers (that in case they had been received in a glazed-Vessel, might have filled the same two inches deep,) in three or four days shall be for the most part exhausted again. And this is plainly visible in newly ared or sandy barren Lands; and likewise in Grounds covered with Vegetables, such Rains are soon imbib'd, and as soon disposed of; yet under these Lands usually issue out large and constant Fountains. For I know several constant Springs issuing from under most barren, sandy, heathy Grounds, that are never observed to encrease after the greatest Rains or most wet Seasons, nor to lessen after the driest; and those sandy Grounds for a great distance from those Springs of no greater height, but that great Rains or Droughts would beget sensible alterations in such Springs, had they no other Original than from Rains, or (indeed) had the Rains any commerce at all with them.

5. If we would but consider further how all those Waters are disposed that fall by Rain and Snow, that alone might be a reason sufficient to induce any one to believe

believe that Fountains and Springs have not from them their Original. Inſtead therefore of wondring what becomes of ſo great quantities of Rain and Snow, from whence Fountains and Springs ſhould proceed, if not from Rain and Snow, we may rather admire from whence ſo much Rain ſhould proceed. If it be ſaid to be a converſion of Air into Water, that cannot be, for Air is as perfect body as Water, only it is more porous or ſpongy, and ſo more capable to be expanded and contracted than Water is; and thereby adapted to receive great quantities of rarefied Water, and detain it until it be again condenſed into its firſt form: And if Rain be ſaid to be exhaled out of the Sea, that is very improbable as to the whole; in part it may, as from all moiſt Bodies. For Salt Water is not ſo apt to diſtil as ſweet Water is; nor do the great Rains (nor Winds which proceed from the ſame cauſe) come ſo often from the Maritime Coaſt as from the more Inland in the great Continents. But Rain is more properly (as may be ſuppoſed with reverence and reſpect to the more Learned) thoſe Particles or Atoms, that by the heat

heat or virtue of the Sun, are exhaled from the Earth, Waters, Vegetables, and all moist Bodies through the pores of the Air, until they are by its frigidity condenſed into thoſe drops that diſtil in the uſual forms of Rain, Hail or Snow, ſo that no part of the Superficies of this Globe can be ſaid to be exempted from contributing to thoſe fruitful Showers that uſually bedew the ſame; which if it be granted, then the 19 inches and more of Water found by the *French Anonymus Author* to fall in every yeat, as is mentioned in Dr. *Plats moſt ingenious Tentamen de Origine Fontium*, Sect. 27. may eaſily be ſuppoſed to be waſted in ſo many of the 365 days that happen to be dry, windy, froſty or hot, in which the moiſture of the Earth is uſually exhaled; for in the beginning of *April* 1683. an inch of Water expoſed to the Sun and Air in an Earthen-Veſſel was waſted in leſs than three days. And in caſe I ſhould preſume to ſay that much more Water was annually exhaled from the Terrene part of this Globe than deſcended on it by Rains, Snow or Hail: I believe I might find Credit amongſt ſome of thoſe that underſtand by what influence

influence all things ſublunar, have their motion and encreaſe, which if true, then certainly thoſe vaſt Fountains that water this Earth have ſome other Original than Rain, *&c.* And in caſe it be objected by any, that the Exhalations from the Sea contribute much towards the encreaſe of Rain: I anſwer, That much Rain alſo falls on the Sea, and not improbably much more than ariſes from it.

2. *That Springs proceed from the Sea.*

Another Opinion ſome (and thoſe more Learned than the other) have received, that Fountains proceed from the Sea by ſubterranean paſſages, and ſo return again above the Earth by way of Circulation; that Rivers never want, nor the Sea ſuperabounds with Water.

1. *Reaſons for that Opinion.*

One Reaſon for that Opinion is, that Wells or Pits digged near the Sea are filled with brackiſh-Water, and thoſe more diſtant with ſweeter, as ſaid *Cardanus*. And he was likewiſe of Opinion, that there were ſweet Waters under the bottom of the Sea, *Lib.* 5. *de ſubtilitate*. It being moſt true, that ſuch Springs that are compoſed of Waters percolated through the Sands, the farther from the Sea

Sea they are, the more ſweet. But thoſe Springs or Fountains that proceed from another cauſe are as ſweet under the Sea as in the higheſt Mountains, as was that Fountain mentioned by *Pliny*, *lib.* 5. *cap.* 31. And as by ſeveral other Examples is demonſtrable.

A ſecond Reaſon. Another Reaſon that ſeems to fortifie that Opinion is, That many Springs, Fountains, and other Waters at great diſtances from the Sea, ebb and flow as doth the Sea next adjacent to ſuch Springs or Fountains, and that ſeveral Fountains are Salt, *&c.* therefore they have a certain Commerce with the Salt Ocean. To which I may anſwer, That ſome Springs lying low and near the Sea may ebb and flow at the ſame time as doth the Sea, by the preſſure of the water in the Ocean againſt the looſe Sands, through which the other part of the Water paſſes that proceeds from the ſame Head: Nevertherleſs the Spring that ebbs and flows near *Newton* in *Glamorganſhire*, although but an 100 Paces from the *Severn*-Sea, is at the loweſt ebb when the adjacent Sea is at the higheſt Flood; and when it is low Water

Water in the Sea, then is the Spring full. As Mr. *Speed* obſerv'd in his Deſcription of *Glamorganſhire*. But that the flux and reflux of Springs that ariſe at any great diſtance from the Sea ſhould be cauſed from the flux and reflux of the Sea, it doth not plainly appear; for that thoſe of any height or diſtance from the Sea do not uſually obſerve the times of the flux and reflux of the Sea: As that of *Weeding-Well* or *Tides-Well* in the *Peak* in *Darbyſhire*. And that the *Cannenſian* Territory near to the Lake *Larius*, which every hour ebbeth and floweth, mentioned in *Pliny*, *lib.* 2. *cap.* 103. and divers others; only that on the top of the Mountain in *Flintſhire* is mentioned by Mr. *Hooke* in his *Micrography*, *p.* 27. to ebb and flow as the Sea doth; but why then do not the Springs that are lower and nearer the Sea? As for Fountains that are Salt, it may be ſuppoſed that their ſaltneſs proceeds from ſome other cauſe than from its Commerce with the *Sea*. For if there could be no other cauſe, then muſt we ſuppoſe that there are *Hot*, *Sulphureous*, *Bitumenous*, *Aluminous* and *Nitrous* Seas, from whence Fountains of thoſe qualities proceed.

But

Reasons against that Opinion.

But if we seriously consider upon what mistake that Opinion is grounded, it will not be difficult to wave it, and embrace a more probable. For many are induced to believe that all perennial Fountains derive their Original from the Sea first by large subterranean passages or canals, and then divided into small capillary Pipes; and so by the immense weight of the Air on the Ocean, such Water is forced into smaller Fountains on the highest parts of the greatest Continents; as *Quick-silver* by the weight of the *Air* without, is raised in the Tube of the *Barometer* within. Or as *Water* is raised in *Glass-Pipes* above the *Superficies* of the *Water* without, by the pressure of the *Air* on the same, which to me seemeth a very great Mistake.

Because if you fill the *Tube* with *Quick-silver*, and with your Finger, or a piece of Leather, stop the open end thereof, then invert the *Tube*, and suffer the *Quick-silver* to strain out at very small passages below, it will descend equally to the same height, as if the end were placed in a *Stagnum* of the same *Quick-silver*; therefore it cannot be the pressure of

of the *Air* without on the *Stagnum* that muſt ſupport the *Cilinder* of *Quick-ſilver* in the *Tube*; for in caſe alſo that you fill a *Tube* with a ſmall bolt-head on it with *Quick-ſilver*, and invert it, that whilſt you ſtop the lower end, the *Tube* is evenly full as in the *Barometer*; yet when you remove your Finger, the *Quick-ſilver* will deſcend ſo far as the extended *Air* will permit it, which will be much lower than that in the *Barometer*. Now if the weight of the ambient *Air* on the Stagnant *Quick-ſilver* were the cauſe of the aſcent of the *Cilinder* of *Quick-ſilver* within, then would that ariſe in the headed *Tube* equally as high as it doth in the *Barometer*; for it is not to be ſuppoſed that the weight of ſo ſmall a quantity of *Air* in the head ſhould depreſs that which of neceſſity muſt be ſupported by a greater weight without, as is pretended.

Beſides, it is moſt apparent that any warmth artificially applied to the head of the *Thermometer* cauſeth the Water in the *Tube* to ſink, and Cold to riſe, whereby it indicates the temper of the *Air* ambient on the head, rather than of the whole body of the *Air* as high as

the *Atmosphere*, which last some have supposed by its weight on the *Stagnum* to support the Water in the *Tube*. The same is in the *Barometer*, but with allowance, as to the difference between *Water* and *Quick-silver*.

As to the ascent of Water in Glass-Pipes open at both ends in the smaller Pipes higher than in the larger, that may very well be supposed to arise from the attractive or sympathetical vertue in the Glass, because the nearer the sides of the Glass are the one to the other, the higher doth the Water ascend; for if the Pipes are short, or so depressed, that the tops are near the surface, the Water will not rise high enough to flow over, although the weight of the ambient *Air* on the *Stagnum* be the same, by reason that the attraction is lessened thereby. All syphonical Filtrations, and Mr. *Hookes* Observations in his *Micrography*, are from the same cause.

Therefore all those Suppositions that are founded on that *Thesis* must stand and fall with it.

But

But the Opinion that comes neareſt to the truth of this matter, is, that hinted at by the Learned Dr. *Stillingfleet, in the fourth Chapter of the third Book of his Origines Sacræ*; which is, that the interior heat of the Earth cauſeth a continual Evaporation of the ſubterranean Waters, which by the cold Superficies are condenſed into Fountains.

3. *That Springs proceed from the Central part of the Earth by way of Diſtillation.*

To maintain which, it muſt be ſuppoſed that the Earth, as one great Animal, containeth in it a Central heat, which by its own motion (as from the heart in the Body) cauſeth that continual Evaporation. Now ſuch a heat and motion in an Animal is maintained and fed from nouriſhment received from without, otherwiſe it would ſoon decay. So likewiſe would it do in this Globe of Earth, in ſo long time as it hath endured, which being ſeriouſly conſidered of, pointeth out unto us the moſt probable Opinion.

Of the true Original of Springs.

IF the Celeſtial Sun be placed in the Center of the Univerſe, virtually giving life and heat to all things that live and move, according to the Laws of Nature inſtituted by God himſelf, as I hope none will deny; It is not the common ſenſible heat of the Air, by what ſoever Accident warm'd, that makes Vegetables flouriſh in the Spring more than in the Autumn. For the Weather is uſually much more temperate and ſenſibly hot in the Autumn than in the Spring: Nor is it the external warmth of the Months of *September* or *October* that excites the Venereal Faculty in moſt Animals, eſpecially Fowl; but it is the Virtual Influence of the Sun in its approach to his *Northern Hemiſphere*, although in cold *January* and *February*, that impregnateth the far greater part of Vegetables and Animals with a power to vegetate, increaſe and multiply.

It

It is not the preſſure of the Air, nor the crowding of it into the Pores of the Earth that forceth the aſcent of Sap in Trees; nor is that ingenious contrivance of the Laborious Dr. *Grew* in his *Anatomy of Plants*, *lib.* 3. *part* 2. *cap.* 1. that gives an aſcent of Sap in Vegetables. But it is the virtual power of the Sun that attracts the Sap into the Branches from the Root; after it hath given the Seed or Root a power to attract the Aqueous Spirit from the Earth. For it is moſt plain, that Seeds ſown, or Trees ſtanding in Earth not wet, or abounding with moiſture, will nevertheleſs attract a far greater quantity of that Aqueous Spirit for its nouriſhment, than that Earth contain'd within the extent of their Roots. For the Atoms of moiſture that continually perſpire, are intercepted by the attracting Roots of Vegetables, where they lie in their way.

Wherefore as Fountains have their Original and Courſe by the Laws of Nature after a moſt certain and ſure Method; why may we not imagine that the virtual Influence of the Sun on this Orb of Earth, moving by a certain Rule and Order, may not excite, and by

attraction beget a continual Evaporation or Perſpiration of moiſture from the ſubterraneal parts thereof, which by the condenſation of its ſuperficial Cortex, may reduce part of ſuch perſpiring Atoms into plentiful Fountains. And thoſe again by flowing into the great Receptacles of Water, the Seas ſupply thoſe defects, ſo great an attraction might otherwiſe be the cauſe of.

It may alſo be ſuppoſed, that the Virtual Influence of the Sun, by the ſame Law of Nature, attracts all thoſe Atoms from the Earth that are not condenſed into Fountains as well as thoſe from the Sea, that afterwards are condenſed by the Air, and ſo plentifully beſprinkle this Globe, and in ſome places make ſo great Inundations.

Seeing then that *Fountains*, *Rains* and *Snows* may probably proceed from one and the ſame Cauſe. The diſcovery of the Original Cauſe of *Rain*, *Snow*, &c. may make that of Fountains more eaſily to be apprehended. It will not be amiſs therefore to offer ſome Conſiderations concerning *The Original Cauſe of Rain, Snow*, &c.

1. The

1. The height of the *Atmoſphere* may be conſidered, which ſome ſuppoſe to be about three Miles in height, above the Superficies of the moſt even part of the Earth, above which no Clouds move. Dr. *Brown* in his *Enquiries into Vulgar Errors, lib.* 2. *cap.* 5. is of Opinion, that the remoteſt diſtance of Clouds is but two miles; which ſeems very rational, if we conſider, that on Mountains a Man may ſee over the Clouds every way. And that as the ſame Author, *lib.*7. *cap.*6. ſeems to allow the perpendicular altitude of the higheſt Mountain to be but four Miles. And the Account that Dr. *Sprat* in his *Hiſtory of the Royal-Society*, gives of the *Pico* in *Teneriff*, relates it to be but two Miles and an half, yet eſteems it to be the higheſt in the World, whoſe top is thought to tranſcend any Clouds, at leaſt ſuch that afford Rain or Snow.

2. It may alſo be conſidered, that Clouds carrying *Rain, Snow, &c.* move not far before they waſt themſelves, or diſtil on the Surface of this Globe: For great *Rains* have fallen on ſeveral parts of this Iſland, when on other parts about the ſame time none have fallen. Great Thunders have alſo happened in ſome

places, when at 15 or 20 Miles distance they have not been heard. *Cardanus*, *lib.* 17. *de subtilitate*, will not allow the Clouds to be above 500 Paces, or half a Mile in height, and visible not above 30 Miles. That a Man being in *Milan* cannot tell when it rains in *France*.

3. If then that Clouds ascend no higher, nor are carried far; then must they arise and encrease near where they fall, which is not difficult to demonstrate; It being conspicuous to every Eye, that Clouds, especially such that are most inclinable to afford *Rains*, &c. do from a very small beginning encrease in view to be large and showring, which sometimes fall not far from the place of their Original. And whereas it is vulgarly apprehended that *Rains* are exhaled from the Sea, and carried by the Wind over the Land; it is against Reason to imagine that the *Rains* that come with a Northern-Wind, and fall in the South parts of this Island, should derive themselves from the Northern-Seas, and be carried with so gentle a gale as they sometimes come withall, over so large a tract of Land 3 or 400 Miles, and not demit so great a burden of Water; and much

much more unreaſonable would it be to think, that all thoſe great *Rains* that come from the Northweſt in the great Continent of *North-America* to the *New-Engliſh* and *Virginean-ſhore*, and thoſe that fall under the *Meridian-line* in *Africa* ſhould be no otherwiſe extracted than from the remote Seas 30 Degrees, or 1800 *Engliſh* Miles diſtant; eſpecially there in thoſe hot Countries, and here in the warmer Seaſons, when *Rains* fall more precipitouſly than where it is colder.

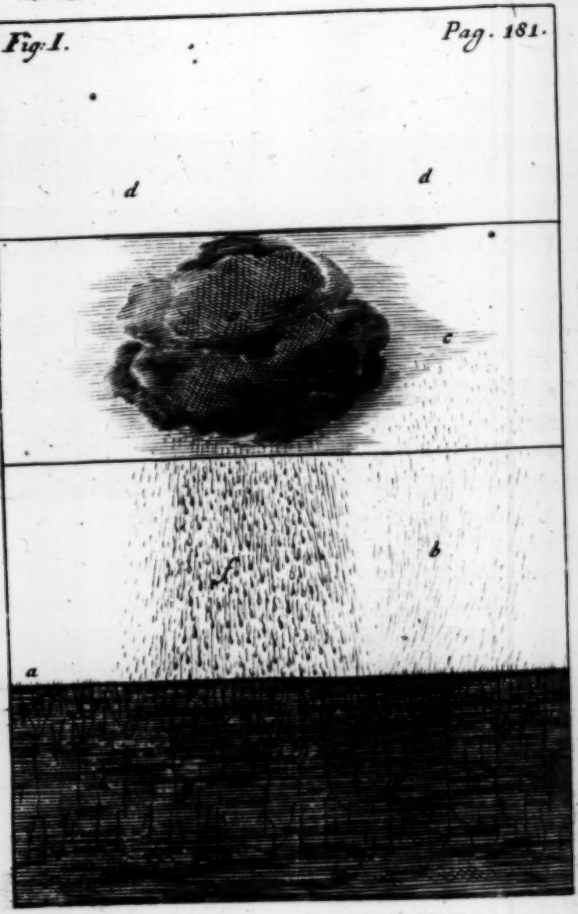
4. If *Rains*, &c. ſhould be no other than Exhalations from the Sea: It muſt be conſidered how all thoſe Vapours and Exhalations from the Earth, from Fountains and Rivers, from Vegetables and Animals, are diſpoſed of. For in Summer time, if you imbible dry Earth with Water, it will in a few days be exhaled by the Sun, as is evident by a Summer *Rain* that would in an Earthen-Veſſel have raiſed an inch or more of Water, in the ſpace of three or four hot days will be exhaled into Vapours. The ſame is to be obſerved in Rivers, Ponds, Fountains, *&c.* that daily Exhalations do ariſe from them, eſpecially in the Summer time: And from Vegetables alſo, which

attract

attract unto themſelves very much of the ſubterraneal Aqueous Spirit, or *Spiritus Mundi*, which Vegetables do daily (throughout the Spring and Summer time eſpecially) emit great quantities of Aqueous Particles. As ſome Trees have Floods of ſuch like flowing a long time through their Trunks and Branches into their Leaves, and thence into the Air; as the *Birch*, the *Vine*, the *Walnut*, &c. A plain demonſtration thereof is alſo to be ſeen in an Acre of Meadow-graſs, which being cut in a hot Seaſon, loſeth in two days time three or four Tun of its weight, which is attracted by the Air. And every Animal, of any indifferent ſize, as well as Man, daily perſpires ſome quantity of moiſture. And the *Air* being a ſpongy Body, and two Miles and more in height, may eaſily be ſuppoſed to contain Water enough (being rarefied) to raiſe 19 inches and much more, in leſs than a years time, being condenſed into Showers.

It will not then ſeem ſtrange to aſſert that *Rains*, *Snow* and *Hail*, are Aqueous Particles, that have been exhaled from the Surface of this *Globe* of Earth and Water, by the Virtual Influence of the *Sun*,

Fig. I. *Pag. 181.*



ſun, and excited ſomewhat by the Central heat of the Earth, and the Spirits that are in the Vegetables and Animals on the ſame. And afterwards are condenſed by the coldneſs of the Air into refreſhing Showers, cold Snows and Hail, which deſcend again on the ſame *Globe*, part thereof imbibing the Earth a little way; the reſidue which the Earth cannot receive flowing through thoſe infinite number of Canals that conduct it into the Ocean, which in all probability is much more than ever was exhaled from it towards the forming of ſo great Showers.

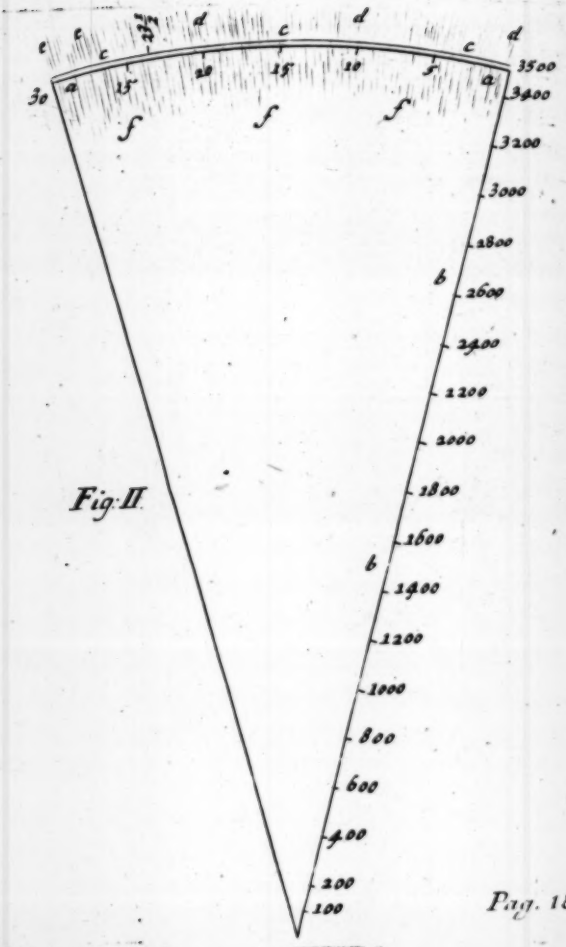
A more plain demonſtration of the forming of *Rain* from thoſe Exhalations may appear in the Scheme here drawn: Fig. 1. *a.* Repreſents the Superficies of the Earth, *b.* the Vapours that continually aſcend in all dry Weather, *c.* the Region of the Air being the ſpongeous receptacle of the Aqueous Particles, *d.* the cold Region which condenſeth thoſe Particles into drops of *Rain*, *Snow* flanes, or *Hail*-ſtones, *e.* the bodies of ſuch Condenſations or Clouds, *f.* the Clouds deſcending in drops, *&c. g.* the perſpiring Vapours of the Earth, which nouriſh

all

all things growing on its Superficies, and afford matter for Fountains and daily Exhalations.

After the ſame manner may thoſe Cataracts of Water that are poured on the Continent of *Africa*, that create the Inundation of the *Nile*, and other *African Floods*, be produced. For it is difficult to imagine that thoſe Waters ſhould be brought from far, if we conſider what hath been ſaid; and how ſmall the height of the Clouds are in compariſon of the diſtance of the Superficies of the Earth from the Center of the ſame; the Semidiameter of this *Globe* being about 3500 Miles, and the height of the Clouds about two Miles, ſuch Clouds muſt appear to be very near the Earth. And the Original of *Nile* being under the *Meridian-Line*, as *Ludolphus* in his *Æthiopic Hiſtory* hath diſcovered, and much nearer than any former Author would allow it, is at leaſt 30 Degrees, or 1800 Miles diſtance from its fall; And at the time of the *Rains* that fall to raiſe that Flood, the Winds conſtantly blow out of the North, as Mr. *Sandys* hath related; how then can it be imagined that ſo great and immenſe a quanity of Waters

can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2000
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Fig: II

can be carried from the *Mediterranean-Sea* to the Original of that *Flood?* But it is not difficult to imagine the cauſe of thoſe Floods to be from the before-mentioned *Theſis*, which may the bettet be explained from the following ſecond Figure.

This Figure Repreſents ſo much of the Superficies of the *Globe* as contains 30 Degrees, being near the length of *Nile* from its head to its fall into the *Mediterranean-Sea*, according to the lateſt Diſcoveries, as at *a. a.* The line *b. b.* is the diſtance from the Center to the Circumference, divided into *Engliſh* Miles; that thereby may be perceived how near the Water-bearing-Clouds are to the Earth, which may be gueſſed at by the ſmall Line drawn on the Superficies of the Earth, at *c. c. d. d.* repreſent the *Sun* beams perpendicularly, darting over the 23 Degrees and $\frac{1}{3}$ from the *Equinoctial*, and a little obliquely on the 6 and $\frac{2}{3}$ remaining Degrees without the *Tropic* of *Cancer* at *e. e. f. f.* ſhew the Vapours or Aqueous Spirits that are continually exhaled from the ſubterraneous parts, by the Virtual Influence of the *Sun*; not only to furniſh the Air with matter for

thoſe

thoſe plentiful Showers, but thoſe Fountains with Water, that throughout the year, ſo plentifully flow from the midſt of ſo large and dry a Territory.

The *Sun* about the 10*th* of *March* is perpendicularly over the *Equinoctial-Line*; it is ſuppoſed that then the *Nile* begins; and about that time the influence of the *Sun* may forceably attract from the inner parts of the Earth an abundance of thoſe particles of Water that may cauſe ſo great *Rains* that ſhortly after happen. And as the *Sun* moveth towards the *Tropic* of *Cancer*, ſo doth its Influence operate: For from the middle of *April* to the tenth of *June* the Winds begin to riſe from the *Meridian-Line* to the *Tropic* of *Cancer*, and ſome ſhort Showers fall during that time.

Theſe Vapours or Exhalations thus attracted by degrees, ſo ſoon as they touch the cold Region, are condenſed and diſtil *guttatim* in ſmaller Showers; but after the *Suns* longer continuance over thoſe parts, and the attraction growing more ſtrong, thoſe Showers or Condenſations are the greater, that from the *Suns* entrance into *Cancer* they encreaſe, and during the month of *July*, and whilſt

whilſt the *Sun* is in *Leo*, the *Rains* are very violent, and then by degrees leſſen till they end, which is about the time of the *Suns* croſſing the *Equinoctial-Line* in its Return towards the *Southern-Hemiſphere.*

So that it may with great reaſon and probability be ſuppoſed that the daily Perſpirations and Exhalations from this *Globe* of Earth are treaſured in the ſpongeous body of *Air* during the diſcontinued times of *Rain*, which in ſome parts of the Country through which the *Nile* runs, happens to be from the end of *September* to the beginning of *April*; and that afterwards the more direct Influence of the *Sun* penetrating deeper into the bowels of the Earth, doth excite the heat that is there. (For it is by none denied, that the deeper any Mines or Cavities are ſunk into the Earth, the warmer is it,) which cauſeth ſo great a perſpiration of that *Mundane* Spirit, or of Aqueous Particles, that they fill and expand the *Air.*

The *Sun-beams* penetrating through the *Air*, thus replete with moiſture, may be the cauſe of thoſe great heats that are between it and the Earth. For the *Sun*

Sun gives a greater heat through *Glaſs*, than through the *Air* only. And the more of moiſture there is in the *Air*, ſo it be finely rarified and tranſparent (as expanded *Air* is) the more violent is the heat of the *Sun-beams* penetrating through it; and ſuch ſultry heats generally preceed Rains or Tempeſts in the Summer-time.

After the Celeſtial and Central *Sun* have thus furniſhed the *Air* with Matter, the ſtronger influence of the Celeſtial *Sun* raiſeth or attracteth the ſame unto the cold Region of the *Air*, which by moſt is ſuppoſed not to be above two Miles and $\frac{1}{3}$ or three Miles above us, where thoſe Particles of Water ſo finely rarified, are condenſed by cold into more denſe or groſs Bodies, which attain the forms of Clouds, and ſoon find their way downwards.

Where the *Air* is more groſs, the Exhalation weak, and the ſuperior Region temperate, as in the more oblique or Northerly parts, there the diſtillations are ſmaller. But where the Exhalations are ſtrong and forceable, the ſuperior Region extream cold, and the *Air* more Rare, as it is nearer the *Equinoctial-Line* than

than at a great distance, as appears by the severity of the cold on the *Pico* at *Teneriffe*, and other Southerly Mountains, where the Snows lie throughout the year, there the Rains are violent and extraordinary.

From these Exhalations rarified may Winds and Tempests proceed: For when the *Sun* approacheth, the Tropic of Cancer, the Clouds and Northern Winds move towards those Parts (as may be supposed) by attraction. For the influence of the *Sun* attracts those exhaled Vapours from those Northern Parts of *Africa* (that lie low on the *Mediterranean-shore*) somewhat farther on the Continent, where the cold Region of the Air hath more power to condense them than on the *Egyptian* coast (where it seldom rains) from which Vapours proceed those Winds: As may be observed in this Island, that Winds oftentimes proceed from moving Clouds, sometimes from one side of the Cloud, and sometimes from the other. And it is also observed, that soon after Mists descend the Hills, Winds as well as Rains follow: Therefore Winds may not be supposed to derive their Original from any remote Cause.

But it may be objected, That those

great *Rains* that water the vast *African Territory*, over which the *Nile* flows, are the Exhalations from the *Mediterranean Sea* carried by the Northern Winds over it, at the times when the *Nile* begins to swell.

To which it may be answered, That it is very improbable that so great a quantity of Water can be exhaled out of that Sea, and carried so near to the Earth, to so great a distance as the head of *Nile*, without being demitted before it come a quarter of the way; the greatness of the Burthen and the thinness of the *Air* considered, such a *Phenomenon* is not reasonably to be demonstrated, nor is it easily apprehensible to consist with Nature.

For those Rains that fall on those Parts must be great, for that they water a vast dry Territory, which may require several inches of Water to moisten it, two, or three Foot in depth, besides the raising of so great a Flood as the *Nile*, which increaseth from *June* 17*th* to *September* 24*th*, and then runs in a declining condition till *May* following; which River is said to water, by its divided Streams, the Land of *Egypt*, at the mouth thereof

thereof about 140 Miles in breadth, or at least its fertile part, and usually riseth 24 Cubits perpendicular at the height of its Flood, as Mr. *Sandys* relates.

Now if those Rains do not derive their Original solely by Exhalations from the Sea, as is not reasonably to be supposed; then is it very likely that they may be Exhalations from the Earth: And if they are such, then may all perennial Fountains be derived from the same Original. For those Aqueous Particles that from the warm interior parts of the Earth, are attracted by the *Suns* superior Influence, or otherwise howsoever to the Superficies thereof, may part of them perspire, and part be intercepted by Minerals, Vegetables, &c. and other part by the cold Rocks, Sands, Clays, Chalk, or the like, be condensed into Fountains.

If therefore that Rains and Fountains have the same Original, then is it not the weight of the Sea that enforceth the Waters through small subterraneous passages to the middle of *Africa*, or any other place to the forming of Fountains. Nor is it the weight of the Saline superficies of the Sea that presseth, the lower part being lighter and less salt, to the ascent

of such high and remote places where usually Fountains flow, as Mr. *Hooke* in his *Micrography* would have it.

For those large Fountains, or rather Floods that issue out of divers Mountainous parts of the World, are too great to be derived from Rains; and if enforced thither through subterraneal Canals by the weight of the Sea, Whence then proceed Rains? And whence do proceed those trickling Waters, and many excellent and exuberant Springs that issue out near the tops of the lesser Mountains about the *Pico* at *Terriffe*, but from those penetrating and perspiring Streams condensed by those extream cold Rocks?

If what is remised be true, then may it be demonstrable how the Rivers, Floods, Fountains and Springs flow into the Sea, which supplieth the interior parts of the Earth with matter sufficient to maintain those perspiring vapours that continually ascend to maintain those Rivers, Floods, Fountains and Springs. So that there hath been, is, and ever shall be a perpetual Revolution of those Waters in which is contained the Natural spirit and life of every Animal, Vegetable and Mineral, in the *Sublunar World*.

The

The cauſes of the Ebbing and Flowing of the Sea, of Tempeſts, Winds, Thunders, various diſpoſitions of Airs, Heats, Dronghts, *&c.* are not difficult to be diſcovered, the before-mentioned Powers and Influences being granted. For if you obſerve in Fig. 11. at *g.* how ſmall a proportion one of thoſe diviſions of 10 miles is to the Semidiater of the Earth, then muſt one mile be ſo much ſmaller, *viz.* as 1 to 3500; Then conſider that the higheſt Tide on our European-Coaſt is not above 70 Foot perpendicular, which is more than 71 times contained in one of thoſe miles, which is almoſt imperceptible, being ſo great a diſproportion to the Semidiameter of this Globe; whence it may eaſily be ſuppoſed, that the *lunar* influence impregnated by the *ſolar*, may by attraction cauſe ſo ſmall a motion as the Flux of the Sea. But more of theſe Matters at another time.

FINIS.